United States Department of Agriculture

Tamarack Grazing Allotment Management Plan

Final Environmental Assessment

umatilla
NATIONAL FOREST

Grant and Wheeler Counties **Heppner Ranger District** **July 2017**

for the greatest good

Responsible Official

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Front Cover Image of Stalling Butte Pasture by Tim Collins.

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Chapter 1. PURPOSE AND NEED

1.1 INTRODUCTION

The Forest Service has prepared this Environmental Assessment (EA) for the proposed update to the Tamarack Grazing Allotment Management Plan, to incorporate and implement the goals and objectives of the Forest Plan and all subsequent Forest Plan amendments. An Allotment Management Plan contains the strategy and actions needed to manage the rangeland resource for livestock grazing in consideration of other forest resources within the range allotment.

This EA describes in detail the following:

- The Proposed Action (Alternative 3) and two additional alternatives: Current Management (Alternative 2) and No Grazing (Alternative 1), also known as the No Action Alternative, as specified in Forest Service Manual (FSH) 2209.13, section 92.31 and Chapter 10 of FSH 1909.15, section 14.2.
- Issues identified during scoping and internal review associated with the proposal; and
- The direct, indirect, and cumulative effects of each proposed alternative on identified resource areas that may be impacted by implementation of this plan.

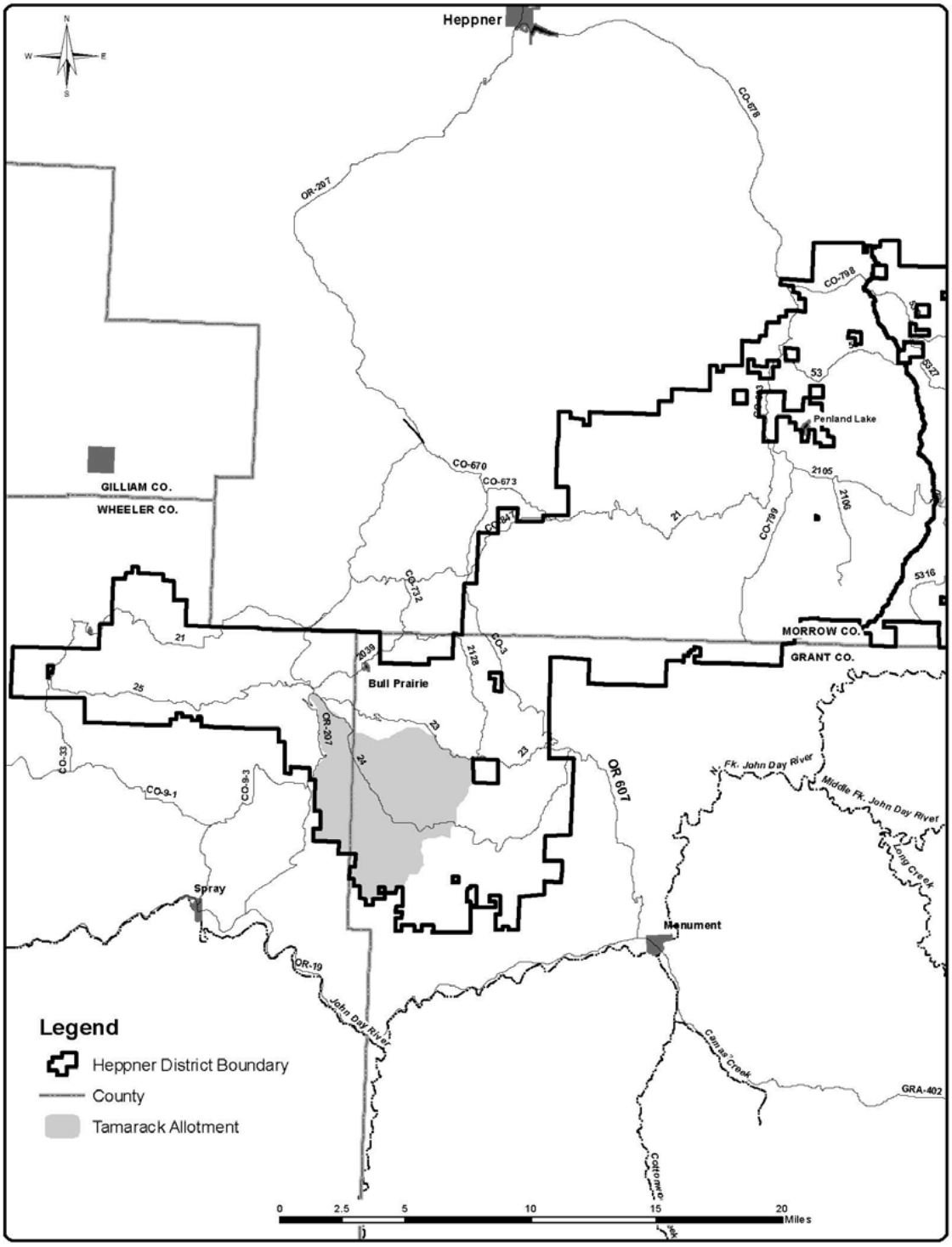
1.2 ALLOTMENT LOCATION

The Tamarack Grazing Allotment is located in the southern portion of the Heppner Ranger District in portions of Wall Creek and Lower John Day River/Kahler Creek watersheds within Grant and Wheeler counties (Map 1-1). It encompasses approximately 19,441 acres, of which 19,391 acres are on National Forest System Lands and 50 acres are on private lands. The main drainages within this allotment are as follows: Big Wall, South Fork of Big Wall, Dark Canyon, Lost Canyon, Haystack, West Bologna, Tamarack, and Burnt Cabin. Elevation ranges from 2,500 feet near Wall Creek to 4,975 feet at Tamarack Mountain. The Tamarack Allotment is not located within an Inventoried Roadless Area (IRA).

The legal description for the Tamarack Cattle Allotment Project is:

- Township 7 South, Range 25 East, Sections 13, 14, and 24-26;
- Township 7 South, Range 26 East, Sections 21, and 26-36;
- Township 8 South, Range 25 East, Sections 1, 2, and 11-14;
- Township 8 South, Range 26 East, Sections 2-11, and 14-22, and 28-30, Willamette Meridian.

Map 1-1: Tamarack Vicinity Map



1.3 BACKGROUND

Allotment History

Domestic livestock grazing first occurred on the Tamarack Allotment area as early as the mid-1800s. Livestock use was not managed until the early 1900s and use records started in 1915. High stocking levels, stock driveways, and lack of management resulted in poor upland and riparian conditions (Langille Report 1903). Stocking levels on this allotment peaked in 1918 (Range Report). Table 1-1 identifies current and past livestock numbers on the Tamarack Allotment.

During the 1940s through the 1960s, stocking levels were being reduced on this allotment while long-term condition and trend clusters were established to monitor upland vegetation. During the 1970s and 1980s, division fences and boundary fences were constructed to increase management of livestock and improve resource conditions. From the late 1980s to present, riparian fences were constructed to reduce impacts caused by livestock and allow the riparian condition to improve.

During the early 1990s there were five permittees on the Tamarack-Monument Allotment. By 1998, the Forest Service and the four remaining permittees managed this allotment as two allotments. From 2001 to present there have been three permittees on the allotment. In 2004, the Heppner District Ranger decided to split administration of the Tamarack-Monument Allotment into the Tamarack Allotment and the Monument Allotment. Currently there are two permittees authorized to graze on the Tamarack Allotment. Map 1-2 shows current allotment boundaries, fence lines, and water developments.

Table 1-1: History and Present use of Livestock Grazing on the Tamarack-Monument Allotment

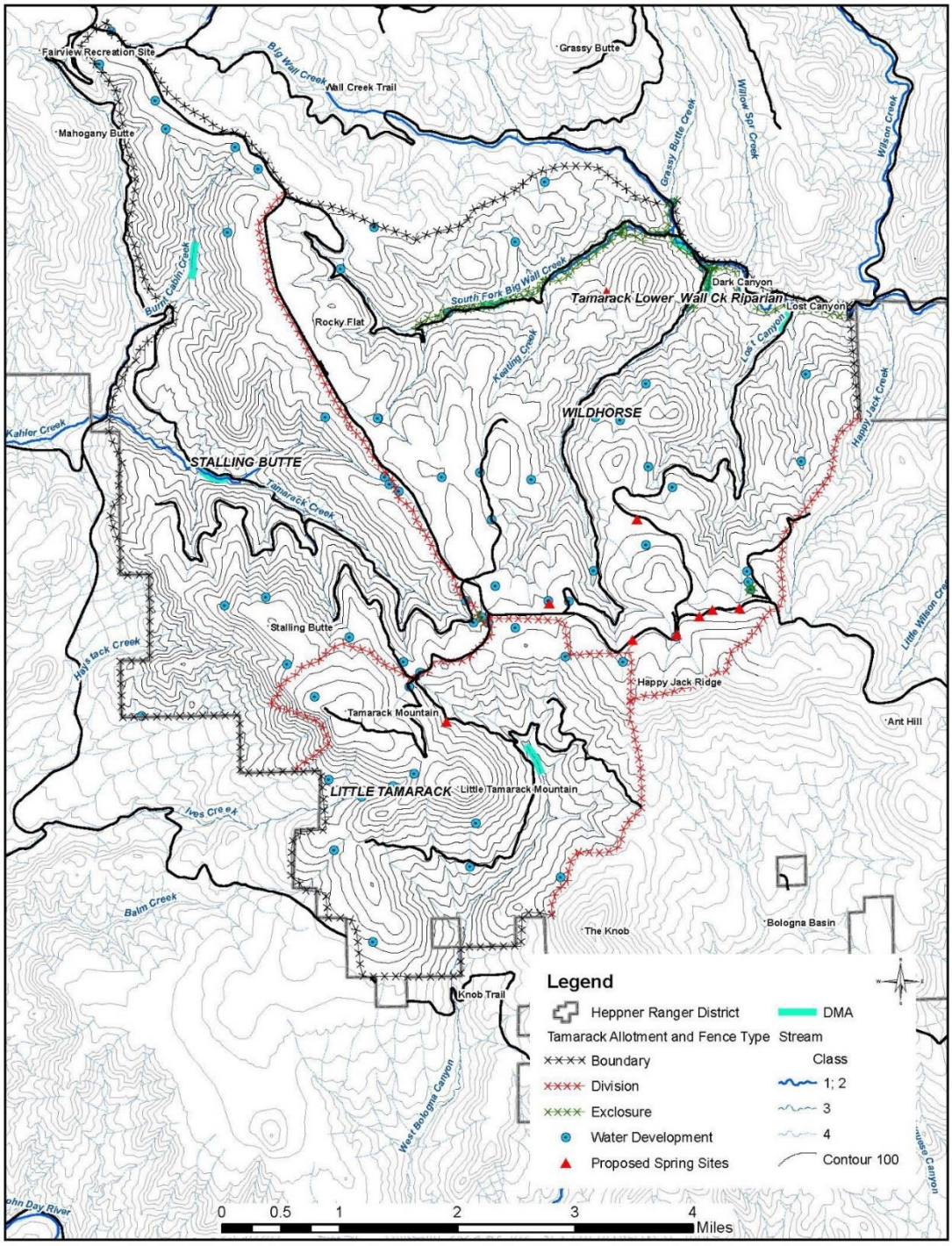
Year	Actual Use*	Season	Head Months	Acres**	Acres/Head Month
1915	1,160	4/16-10/31	7,540	35,000	4
1916-1917	1,600	4/15-10/31	10,400	45,000	4
1918-1926	2,000	6/16-09/30	7,000	60,000	8
1927-1929	549	5/01-10/31	3,294	47,000	14
1930-1953	562	5/16-10/15	2,810	41,500	14
1954-1965	618	5/16-10/15	3,090	41,500	13
1966-1977	519	5/16-10/15	2,595	38,202	14
1978-1981	500	5/16-10/15	2,500	38,202	15
1982-1990	530	5/16-9/30	2,385	38,202	16
1991-1994	541	5/16-9/30	2,511	38,202	15
1995-1998	501	5/01-9/15	2,255	38,522	17
1999-present	209	5/01-9/15	954	19,441	20

*All include private land numbers and refer to the average number of livestock grazed.

**Acres before 1970 from records and more recently from GIS. Acres are very close but may be discrepancies due to lack of tracking of changes in allotment boundaries.

***From 1998 to 2004 the Tamarack-Monument Allotment was managed as two separate allotments. In 2004, an administrative decision was made to split the allotment into two different allotments (Tamarack and Monument Allotments). Prior to 1999, all numbers are a combination of the current Tamarack and Monument Allotments. Numbers after 1999 are for the Tamarack Allotment only.

Map 1-2: Tamarack Allotment Map



The current Environmental Assessment (EA) and Allotment Management Plan (AMP) were approved for the Tamarack Monument Allotment in 1978. The current Forest Plan was signed in 1990 and amended by the PACFISH Environmental Analysis in 1995. As a result, changes required by new laws and policies were implemented in Term Grazing Permits and implemented within functional Annual Operating Instructions (AOI).

1.4 Purpose of and Need for Action

The purpose of this project is to comply with the Rescission Act of 1995 (Public Law 104-19, Section 504) requiring NEPA analysis on the Tamarack Cattle Allotment. There is a need to continue authorization of livestock grazing consistent with the goals and objectives of the Umatilla National Forest Land and Resource Management Plan (Forest Plan) to maintain or improve resource conditions. This action is needed on the Tamarack Cattle Allotment because 1) existing laws, regulations, and policies direct the Forest Service to allow livestock grazing on National Forests; 2) there is public demand from qualified livestock operators for continued livestock grazing in these allotments; and 3) to maintain satisfactory conditions of riparian vegetation and upland areas within the Tamarack Cattle Allotment. There is a need to authorize grazing to meet the social and economic needs of Grant and Wheeler Counties and of the permittee to continue grazing on this allotment.

Umatilla National Forest Land and Resource Management Plan

The Umatilla National Forest Land and Resource Management Plan (Forest Plan) guides all management activities and establishes management standards and guidelines for the Umatilla National Forest. It recognizes the continuing need for forage production and has determined that the Tamarack Allotment is capable and suitable to support grazing by domestic livestock. Additional management direction is provided by Umatilla Forest Plan Amendments approved since 1990.

The Forest Plan allocates management areas as the way to characterize the landscape for the type and intensity of management activities that may occur on the Umatilla National Forest. Management areas within the project planning area are shown in Table 1-2 (see Map 1-3: Management Areas within the Tamarack Allotment).

Table 1-2: Forest Plan Management Areas within the Tamarack Allotment

Management Strategy	Acres within Allotment	Compliance with Forest Plan Strategy	Page Number within Forest Plan
A4-Viewshed 2	309	Yes	4-110
C1-Dedicated Old Growth	628	Yes	4-149
C3-Big Game Winter Range	3,564	Yes	4-157
C5-Riparian Fish and Wildlife	567	Yes	4-171
D2-Research Natural Area	84	Yes	4-183
E1-Timber and Forage	14,226	Yes	4-186
P-Private	50	N/A	N/A
Total Acres	**19,441**		

A4 **Viewshed 2 (309 acres):** A moderate level of livestock grazing is permitted. Openings created by management of timber stands should be available for management as transitory range. Development and maintenance of range improvements are permitted. Range utilization standards, management practices, and improvements are to be designed and managed to meet visual quality objectives (Forest Plan 4-110.

C1 **Dedicated Old Growth (628 acres):** Moderate levels of livestock grazing are permitted; however, forage in general will be limited to that which normally occurs under densely forested canopies. Maintain existing range improvement structures (Forest Plan 4-149).

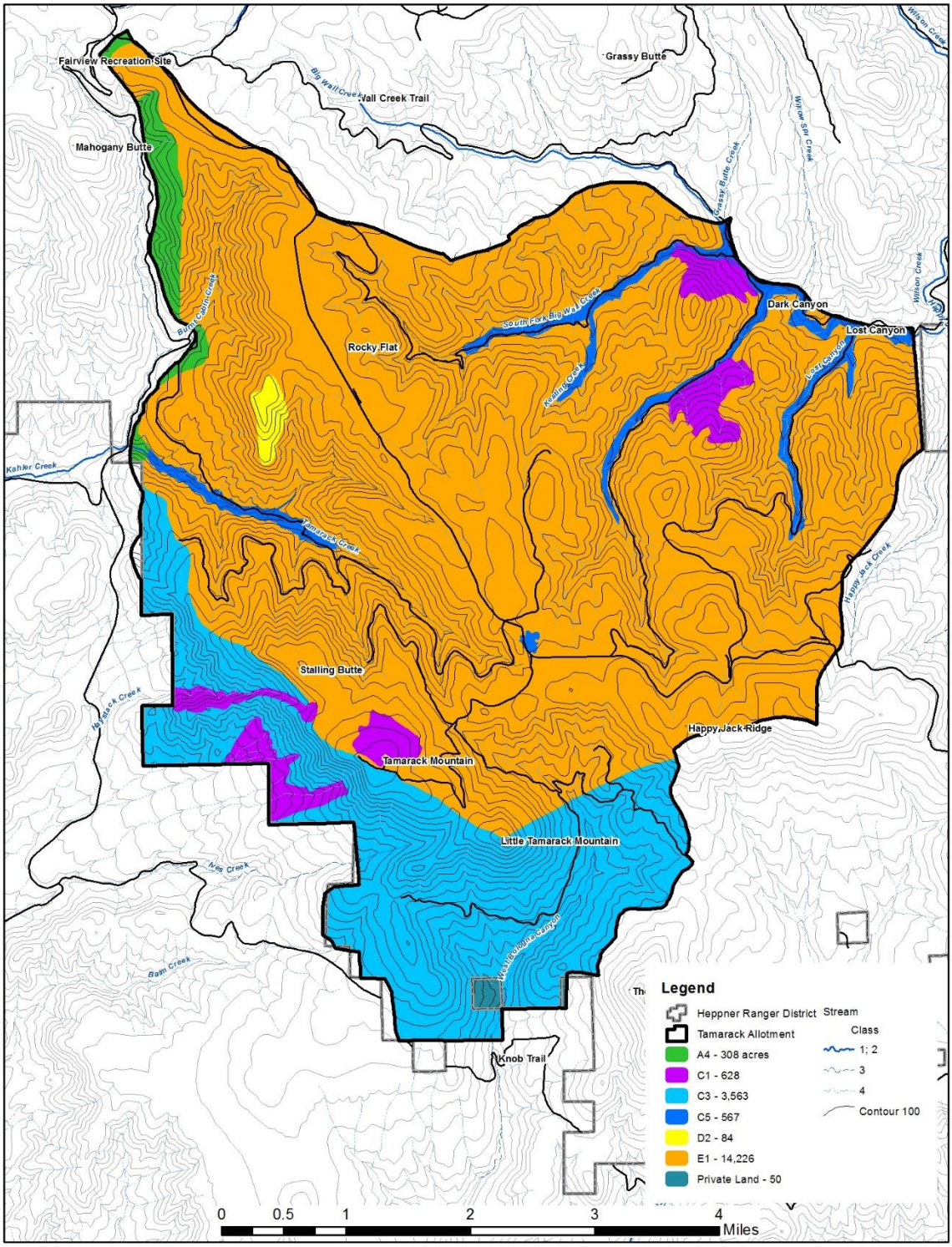
C3 **Big Game Winter Range (3,564 acres):** Domestic livestock grazing is permitted at Range Management Strategy C. Structural range improvements are permitted to the extent they are compatible with big game winter ranges (Forest Plan 4-157).

C5 **Riparian Fish and Wildlife (567 acres):** Intensive range management, including superior grazing systems, such as periodic rest, will be practiced to protect and improve riparian vegetation and anadromous fish habitats. Range improvements that maintain or enhance riparian habitat goals will be permitted (Forest Plan 4-171).

D2 **Research Natural Area (RNA, 84 acres):** Prohibit grazing of domestic livestock unless it is needed to establish or maintain a specific vegetation type. Improvements are not permitted; boundary fencing may be required to provide protection to the RNA (Forest Plan 4-183).

E1 **Timber and Forage (14,226 acres):** Manage range and livestock though Range Management Strategies C and D with improved management systems. The full range of development and maintenance of structural and nonstructural improvements is permitted (Forest Plan 4-186).

Map 1-3: Management Areas within the Tamarack Allotment



1.5 ISSUES

Issues serve to highlight effects or unintended consequences that may occur upon implementation of a Proposed Action or its alternatives. Identifying issues creates the opportunity to explore alternate means of meeting the purpose and need for a project, while also reducing adverse effects, and allowing for a clearer comparison of the trade-offs. This allows the decision maker and the public to better understand the effects of an action, and therefore helps them make a decision. In this EA, issues are phrased as cause-effect statements, relating actions to effects. Issue statements describe specific actions and the environmental effect(s) expected to result from those actions. Cause-effect statements provide a way to understand and focus on the issues relevant to a particular decision.

By reviewing responses received during scoping, the Tamarack Grazing Management Plan Project Interdisciplinary Team (IDT) identified issues relating to the Proposed Action based on input from other agencies, organizations, and members of the public, as well as Forest Service resource specialists. The issues were then separated into two groups, as directed by the CEQ regulations (40 CFR 1500.4(g) and 1501.7): key issues and other issues. Key issues are defined as those directly or indirectly caused by implementing a proposed action. Other issues are identified as those that may serve to show differences between alternatives for various resources, but were not drivers in alternative development.

Once a key issue was identified, the IDT selected measures to allow them to compare each alternative's effect on that issue. Where possible, measures are quantifiable, chosen with regard to predictability and responsiveness to the issue, and link to the cause-and-effect relationship between the alternative and the issue. The Heppner District Ranger helped the IDT develop these key issues and measures, and approved them for further analysis. Full text documents of scoping comments are available in the project file.

Key Issues

Specialists used the key issues they identified to analyze how each indicator/measure is likely to differ under each alternative. The following issues and indicators will serve to compare each alternative within the Tamarack Grazing Allotment environmental analysis:

Issue #1: Livestock grazing could potentially impact forest health and the desired future condition of vegetation composition.

Vegetation Composition indicator(s): end-of-season stubble height, percent bank alteration, percent of available forage, and herbaceous and woody shrub utilization levels and trends. Change in potential habitat for botanical species and potential spread of invasive plant species also address the impact of proposed actions to the vegetation composition. (See analysis in Sections 3.1, 3.3, 3.6, and 3.7)

Issue #2: The project could potentially impact water quality, wildlife trends, riparian areas, and cultural resources. This issue will need to be addressed in the project design and described in effects analysis.

Water Quality Indicator(s): comparison of temperature, dissolved oxygen, pH, and sediment, as well as change in riparian vegetation and change in soil productivity. (See analysis in Sections 3.3, 3.4, and 3.5).

Wildlife Trend Indicator(s): for ungulate species, change in available forage based on stubble heights, soil conditions, utilization trend/composition, change to access to water sources, and change in restriction of herd or individual movement. Overall, the change to the density and distribution of habitat and the change in the availability of food, including change to potential

prey. For aquatic species water quality measures and the change to riparian vegetation (see Section 3.2, 3.3, 3.4, and 3.5).

Riparian Area Indicator(s): measurement of riparian vegetation stubble heights, change of trend or composition of riparian vegetation and habitat, as well as indicators used to measure water quality (see analysis in Sections 3.1, 3.3, and 3.4).

Cultural Resource Indicator(s): disturbance to site or to culturally significant plants (see analysis in Sections 3.1 and 3.8)

1.6 PUBLIC INVOLVEMENT

The Tamarack Project was initiated in January 2016 with a letter to interested parties and tribes. The public scoping comment period was from January 16, 2016 to February 15, 2016. Using the comments from the public, other agencies, and tribes affected by this project, the interdisciplinary team identified two issues to address in the draft EA.

Letters were sent on December 12, 2016 to invite interested and affected parties to participate in the public comment period on the draft EA. On December 20, 2016, a legal notice was published in the *East Oregonian*, initiating the 30-day public comment period on the draft EA. Comments received on the draft EA on or before January 19, 2017 were considered timely and were addressed in Appendix C of this final EA. Modifications were made to Chapter 3 of this final EA to help clarify concerns identified during the public comment period (see Appendix C).

The Forest Service also consulted with the State of Oregon, the National Oceanic and Atmospheric Administration (NOAA) Fisheries (also known as NMFS), and the US Fish and Wildlife Service during the development of this EA.

As required under the 1973 Endangered Species Act (ESA), as amended, Section 7 consultation for the Tamarack Allotment was completed in 2013. As described in the Letter of Concurrence (WCR-2013-138), Section 7 consultation must be re-initiated if the action is modified in a manner that causes an effect not previously considered. The effects of the Proposed Action would not be inconsistent with the effects already considered in the 2013 Letter of Concurrence. If the Forest subsequently obtains funding for new riparian fencing and determines that the construction could potentially affect ESA-listed species or designated critical habitat, that new component of the Tamarack Allotment project would trigger a new consultation under the 2013 Programmatic Aquatic Restoration Biological Opinion (ARBO). The ARBO programmatic agreement provides a stream-lined ESA Section 7 approach for projects that protect and/or restore aquatic resources.

Tribal Consultation and Treaty Rights

There are numerous federal statutes that require federal agencies to consult or coordinate with Native American Tribes—the United States acknowledges federally recognized tribes as sovereign nations; hence, interaction takes place on a "government-to-government" basis. There is a federal trust responsibility, largely rooted in treaties through which Indian tribes ceded large portions of their aboriginal lands to the United States in return for the protection of tribal rights as self-governing nations within the reserved lands (i.e., reservations) and certain reserved rights (e.g., aboriginal hunting, fishing, and gathering rights) to resources outside of those lands.

Furthermore, under the canons of construction, the Federal Government recognizes that: (1) treaties should be liberally construed in favor of tribes, interpreted as tribes would have interpreted the treaties at the time of signing them; (2) ambiguities in treaties should be recognized in favor of tribes; and (3) tribes have reserved rights established in treaties and case law.

The project area contains Ceded lands and/or Usual and Accustomed lands for two different groups: the Confederated Tribes of the Warm Springs Reservation of Oregon (Wasco, Warm Springs, Paiute); and the Confederated Tribes of the Umatilla Indian Reservation (Walla Walla, Cayuse, Umatilla Tribes). Government-to-government letters were sent to these Tribes before public scoping was initiated. No comments were received on the initial Proposed Action prior to drafting this EA. The heritage report was sent to SHPO and the Tribes on July 21, 2016 for consultation (Umatilla National Forest Heritage Project: # R2019061400047). SHPO concurrence was received on August 11, 2016, there was no response from the Tribes.

1.7 Decisions Framework

The scope of the analysis and the project decisions are limited to the area of the proposed Tamarack Grazing Allotment Management Plan. This EA will provide the Deciding Official (the Heppner District Ranger) with information needed to make the following decisions regarding this proposed project: 1) whether or not to proceed with the Proposed Action or one of the other action alternatives at this specific point in time; 2) select the appropriate alternative that would provide the desired condition of the Tamarack Grazing Allotment project area by meeting Forest Plan direction and also addressing identified needs and issues; 3) if additional project design features and monitoring requirements need to be applied to the proposed activities; and 4) determine if the selected alternative would have a significant effect on the human environment, requiring preparation of an Environmental Impact Statement.

Chapter 2. PROPOSED ACTION AND ALTERNATIVES

The Forest Service developed four alternatives, including the No Grazing Alternative (Alternative 1) continuation of the current grazing management system (Alternative 2), and the Proposed Action (Alternative 3). This chapter describes and compares the alternatives considered for the Tamarack Grazing Allotment Management Plan. Included in this section are descriptions of each alternative. Clarifications were made to the descriptions of Alternative 2 and 3 between the draft and final EA. These editorial modifications were made to increase readability and were in response to internal review.

2.1 ALTERNATIVE 1

Under the No Grazing Alternative, livestock would no longer be authorized within the project area and the Tamarack Allotment would be vacated. The existing permit would be phased out after giving the permittee notice as provided for in the Forest Service Handbook (FSH) 2209.13, Chapter 10. Improvements such as fences, gates, and pipelines would be removed, as time and funding allows. However, if these improvements are identified as important for other resource needs (e.g., as a water source for wildlife), they could remain in place.

2.2 ALTERNATIVE 2

This alternative would continue the current grazing management system for the Tamarack Allotment that has been implemented through the term grazing permit and annual operating instructions. No additional spring sources or fencing would be considered as part of this alternative. The allotment is currently and would continue to be managed under an extensive management strategy identified in the Forest Plan (p. 4-64). This strategy incorporates management systems and techniques to obtain relatively uniform livestock distribution and forage use that maintain plant vigor.

Under this alternative, a maximum of 209 cow/calf pairs, or their equivalent, would be authorized from May 1 through September 15. Livestock would not be authorized before this on-date or after this off-date. Management would be modified or adjusted within these stocking and seasonal parameters, if needed, based on resource conditions or unpredictable events (e.g., fire, drought, saturated soils).

The allotment uses a deferred rotation grazing system. Livestock are moved among four pastures, which include the Little Tamarack, Stalling Butte, Wildhorse, and Wall Creek Riparian pasture. Pasture management under current NOAA Fisheries (NMFS) consultation requirements protect spawning habitat and occupied habitat for the federally listed Middle Columbia steelhead. If additional fencing or other mitigations are implemented to meet these or other federally listed species requirements, these seasonal restrictions could change.

Under the current guidelines established by NOAA Fisheries and Oregon Department of Fish and Wildlife (ODFW), livestock may not graze a pasture where there may be steelhead (a subspecies, along with rainbow trout, of *Oncorhynchus mykiss*) spawning until after July 15th annually, dependent on resource conditions. The Wildhorse and Wall Creek Riparian Pastures are currently grazed after July 15th. Actual pasture rotations and number of days livestock spend in each pasture depends on annual resource condition variations. The number of days in each pasture could be modified from year to year, per instructions provided to the permittee in the Annual Operating Instructions prior to the grazing season.

Table 2-1: Tamarack Allotment current management

Pasture	Cow/calf Pairs[1]	Days in Pasture[2]	Period of Use Restriction[3]	Acres
Little Tamarack	209	70	None	4,155
Stalling Butte	209	60	None	6,217
Tamarack Lower Wall Creek Riparian	25	1-10	After July 15th	126
Wildhorse	209	80	After July 15th	8,873

[1] This is the maximum number of livestock that would be grazed in each pasture and could be less at any particular time depending on resource conditions and/or monitoring results. (Forest Plan-required allowable use standards and other requirements designed for achieving desired conditions.)

[2] This is the approximate number of days spent in each pasture in any one year and could vary depending on resource conditions and/or monitoring results. (Forest Plan-required allowable use standards and other requirements designed for achieving desired conditions.)

[3] This is the date established by NOAA Fisheries and Oregon Department of Fish and Wildlife to protect steelhead and bull trout.

Table 2-2: Current Miles of Riparian Fence on the Tamarack Allotment

Pasture	Name	Fence Miles	Type	Year Constructed
Wildhorse	South Fork Wall	5.25	Barbed Wire	1999-2000
Wildhorse	Dark Canyon	1.5	Barbed Wire	1999
Wall Creek Riparian	Wall Creek	2.5	Barbed Wire	1978

Range Improvements and Maintenance/Reconstruction

There are approximately 44 miles of boundary, division, and enclosure fences on the allotment and their presence is critical to managing livestock on National Forest. These fences are maintained annually and will be reconstructed when no longer functioning properly. Many fences are not near roads, four wheel drive pickups and ATVs may be used to haul supplies material and tools to the fenced right-of-way. There are currently 62 water developments (pond and spring developments) on the allotment. Upland water developments are critical for the continued management of livestock on the allotment and are kept functioning through continued annual maintenance. Pond, dam, and spillway maintenance could involve removing silt and debris. This maintenance is usually performed with heavy equipment. Spring maintenance to improve the water collection system also often involves heavy equipment to install underground pipe from the collection system to the water trough and overflow.

Corrals and Holding Areas

Temporary and permanent corral systems are needed to load and unload cattle on the allotment throughout the grazing season. The Tamarack Allotment has three permanent corral facilities, located on the following roads: 100, 2400, and 2406. There is also a need to be able to use portable corral system to unload and or load livestock where needed. These range improvements require annual routine maintenance and repairs as part of implementing all action alternatives and would occur prior to and throughout the grazing season.

2.3 Alternative 3 (Proposed Action)

The Proposed Action was modified after scoping to become Alternative 3. Tamarack Allotment and rangeland conditions are stable or are improving. Alternative 3 does not propose any changes in the number of livestock grazed, the overall season of use, or allowable forage utilization.

Livestock would be rotated among the Little Tamarack, Stalling Butte, Wildhorse and Wall Creek Riparian pastures on a deferred-rotation system. Additional upland water sources would be developed to improve livestock distribution. Construction of additional riparian fences would reduce the potential effects of livestock grazing within sensitive riparian areas.

Under Alternative 3, changes were made to the original Proposed Action. These modifications help to address the purpose and need for action and would move the allotment toward desired conditions.

Riparian Fence Construction

Additional riparian fence would be constructed in Dark and Lost Canyon Creeks. In the mid-1990s much of Dark Canyon was fenced to protect the riparian area from livestock grazing and to reduce effects to riparian habitat. However, recent stream surveys of Dark and Lost Canyon Creek have discovered Middle Columbia steelhead spawning outside existing exclosures, indicating that additional fencing to protect spawning grounds may be needed. This fencing would maintain consistency with the 2013 Letter of Concurrence if cattle are to be grazed in these areas prior to July 15th.

Water Developments

Construct nine additional upland water developments to improve the distribution of livestock on the allotment. Prior to installation of riparian fencing, livestock watered in streams on the allotment. Since many of the streams have been fenced since the mid-1990s to later 2000s, there is a need to provide additional off-stream water developments to continue to improve resource conditions in riparian areas and upland areas.

Table 2-3: Alternative 3 Proposed Miles of Riparian Fence on the Tamarack Allotment.

Pasture	Name	Fence Miles (Approximate)	Type	Year Constructed
Wildhorse	Dark Canyon Creek	2	3-strand Barbwire	As need is determined
Wildhorse	Lost Canyon Creek	2	3-strand Barbwire	As need is determined

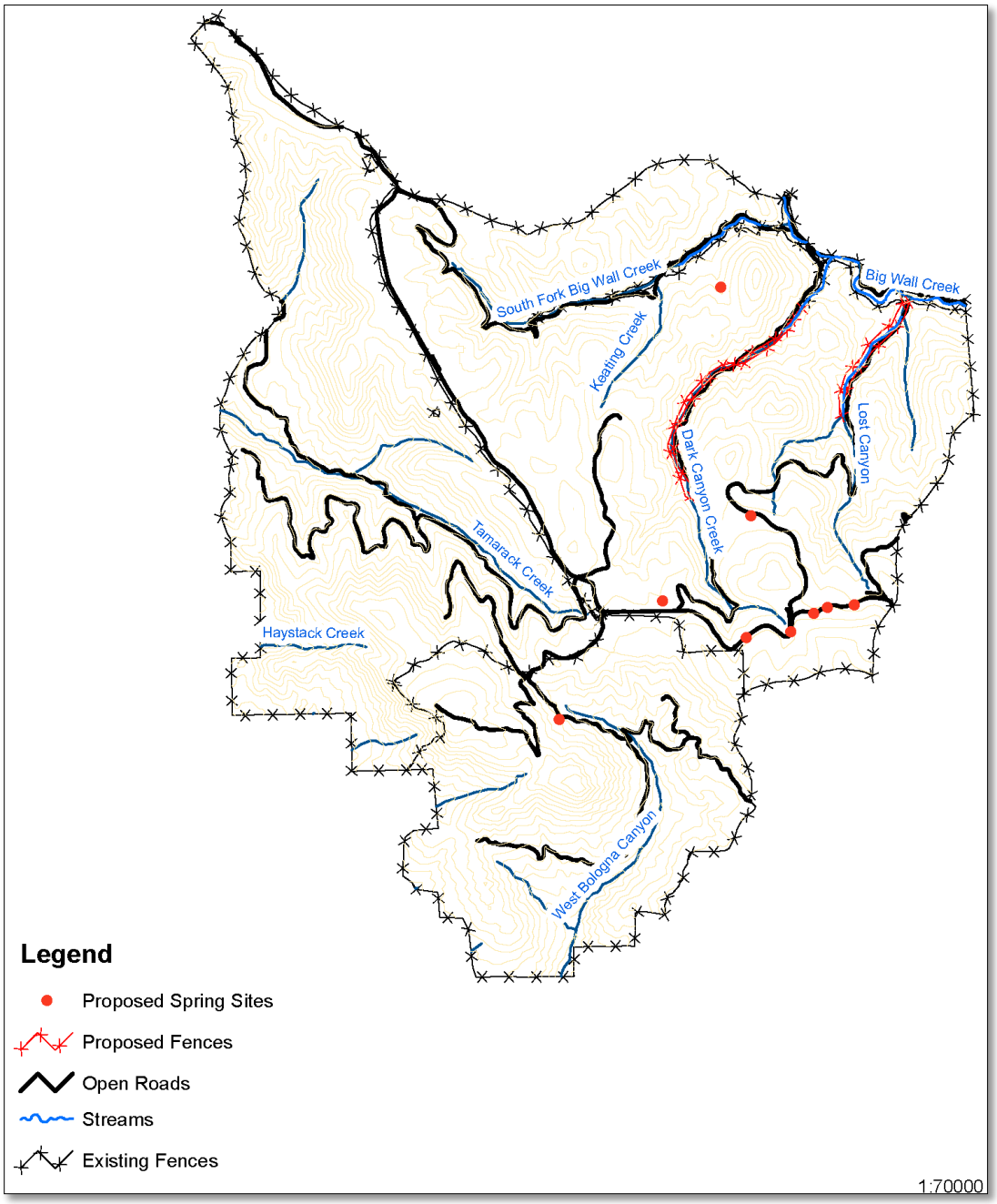
Range Improvements and Maintenance/Reconstruction

Same as the current management activities as described in Alternative 2.

Corrals and Holding Areas

Temporary and permanent holding areas, including temporary and permanent corrals, fences, and water developments would continue to be used as described under Alternative 2.

Map 2-1: Proposed Fences and Spring Sites in Alternative 3



2.4 Comparison of Alternatives

Table 2-4: Comparison of Alternatives by Actions Proposed

Proposed Actions	Alternative 1	Alternative 2	Alternative 3
Cow/Calf Pairs (Maximum)	0	209	209
Water Developments	0	62	68 to 71
Additional Fencing	0	0	Up to 6 additional miles

Chapter 3. AFFECTED ENVIRONMENT AND IMPACTS OF THE PROPOSED ACTION AND ALTERNATIVES

This section summarizes the potential impacts of the Proposed Action and alternatives for each impacted resource. Minor modifications were made in this section to address internal review and based on public comments on the draft EA. Modification or clarification made in the this section include:

- Added description of the current condition of the Tamarack Allotment based on monitoring data that was available in the Range Resource Report during the public comment period on the draft EA. This information was added to the body of the final EA to help frame the current condition in the Affected Environment in Section 3.1.
- The Fisheries, Section 3.4 was modified to respond to public comments and internal review to clarify the effects of proposed activities on the indicators used to measure change between alternatives.
- Added Soils (Section 3.5), Invasive Plants (Section 3.7), Social and Economic (Section 3.9), and Climate Change (Section 3.10) sections to this chapter. The information added to the body of this chapter was available in the corresponding resource reports. All resource reports associated with these sections were available during the public comment period. Copies of these reports were made available for public review at the Heppner Ranger District and were posted to the project website during the comment period on the draft EA. These sections were added to the final EA based on internal review and public comment.

3.1 RANGE

This section incorporates by references the range report located in the project file. This report contains the data, methodologies, analysis, maps, reference, and technical documentation that the specialist relied on to reach the conclusions discussed in this section. Spatial boundary for analysis of the effects to range is the Tamarack Allotment.

Methodology

Upland Vegetation

To assess the Tamarack Allotment and determine the existing conditions of vegetation, a variety of tools were used. Assessment of range health was conducted on grasslands across the allotment using the Interpreting Indicators of Rangeland Health protocols (Pellant et al. 2005). Past grazing management and the results were analyzed. Past utilization levels and general field reconnaissance was also used to help determine if management was meeting objectives for the allotment. Established condition and trend plots were analyzed to determine trend and range health (see Section 5.4 of the range report). Photo interpretations were also used in conjunction with the collection and analysis of data. All of these assessment tools were cumulatively used to determine the conditions of vegetation within the allotment. See Section 5 of the range report (Collins 2017) for a summary of the results of this assessment.

Riparian Vegetation

Implementation monitoring focuses on utilization and residual stubble height monitoring on riparian habitats. Utilization monitoring measures the percentage of available forage that has been consumed (weight of plant, number of plants, twigs, etc.). Utilization monitoring can be used to identify use patterns, help establish cause-and-effect relationships, and aid in making adjustments to the grazing

strategy (Interagency Technical Reference 1734-3, 1999). Implementation monitoring is used to adjust annual operating instructions to manage permitted livestock number in a pasture for a planned number of days. The number of days livestock spend in a pasture is looked at annually prior to the grazing season and adjustments in days is often changed during the grazing season to meet utilization/management objectives. Appendix B of the range report identifies the riparian habitat present in the Tamarack Allotment and gives the Forest Plan standards for utilization in these habitats.

Effectiveness Monitoring

Effectiveness monitoring, or long term monitoring, is used to determine the condition and trend of upland and riparian vegetation as they relate to livestock grazing activities in the Tamarack Allotment.

Monitoring occurs prior to livestock entering the Forest, during the grazing season, and after livestock leave the Forest. Monitoring methods used involve range readiness checks (plant and soil conditions prior to turning livestock onto the allotment); compliance checks (visual inspections of utilization on pastures during the grazing season); monitoring post-livestock use (designated monitoring areas within pastures using percent use estimates and measuring riparian stubble height on greenline vegetation on riparian areas). See range report for details on the results of past effectiveness monitoring.

Summary

Monitoring on the Tamarack Allotment indicates that resource conditions have been improving in both uplands and riparian areas. The range report contains more detailed information: it identifies monitoring requirements (Section III, page 8), the types of monitoring currently used (Appendix B), and the results of previous condition and trend monitoring (Appendices C and D).

Affected Environment

Current livestock management on the Tamarack Allotment authorizes 209 cow/calf pairs annually, from May 1st through September 15th. These on-dates and off-dates may be adjusted due to resource conditions or unpredictable events (fire, drought, saturated soil conditions). Table 2-1 identifies each pasture within the allotment and associated acreages, cattle days, period of use restrictions for ESA listed Middle Columbia steelhead. The current grazing system is a deferred rotation system on pastures within the allotment. The Tamarack Allotment consists of the Little Tamarack, Stalling Butte, Wildhorse and Wall Creek Riparian Pastures. The Stalling and Little Tamarack pastures are used primarily early to mid-season, depending on resource conditions and objectives for the grazing season. The Wildhorse pasture is used primarily mid to late season, depending on the management objectives for the season. The Wall Creek riparian pasture grazing strategy is to limit livestock use during the late season, depending on resource objectives. Pastures within the Tamarack Allotment are grazed annually by livestock. Best Management Practices (improve soils and water quality) design criteria, and Forest Plan and PACFISH standards and guidelines are currently being implemented to provide better management and to improve resource conditions on the allotment in uplands and riparian areas (see Appendix A).

Many riparian areas have been fenced to exclude livestock to improve resource conditions on riparian habitat within the allotment. Within the Tamarack Allotment 17 percent of the land base within the allotment (approximately 3,305 acres) are associated with riparian areas and 83 percent of the land base is associated with uplands vegetation (16, 138 acres are forest and non-forest vegetation types). Of the 17 percent land base associated with riparian areas approximately 48 percent of those acres are excluded from livestock use using permanent barbed wire fencing. Approximately 52 percent of the

total riparian areas that is not excluded from livestock use includes upland ephemeral channels and dry swale areas where water is limited to early season runoff. The Tamarack Allotment has consistently met prescribed utilization standards for the allotment.

Monitoring on the Tamarack Allotment indicates that resource conditions are improving in the uplands and on riparian areas. Monitoring has been used to assess conditions of the resource on the allotment. Forest Plan objectives are currently met using the best management practices (BMPs) described in Appendix A and monitoring that has been used to validate that resource conditions are in satisfactory condition and are continuing to improve. Upland water developments, livestock management (season of use and livestock numbers), mineral placement, livestock herding and fencing sensitive areas has been an important part of the successful management of this allotment. Many of the riparian fences that were constructed in the mid-1990s have improve resource conditions on sensitive riparian area. The continuation of the current resource management on this allotment is important to maintain satisfactory resource conditions. Continuing to maintain and improve current and proposed upland water developments, fences are necessary to continue to improve resource conditions on the allotment.

Water Sources

Within the Tamarack Allotment, 62 water sources have been developed to distribute livestock throughout the uplands and are currently maintained annually.

Riparian Fences

There are approximately 9.25 miles of riparian fence on streams within the Tamarack Allotment and are identified in Table 3-1 below. These fences are designed to improve livestock distribution in the uplands and to enhance riparian conditions and are maintained annually to meet management objectives.

Table 3-1: Miles of Riparian Fence on the Tamarack Allotment.

Pasture	Name	Fence Miles	Type	Year Constructed
Wildhorse	S. Fork of Wall Creek	5.25	Barbed Wire	1999-2000
Wildhorse	Dark Canyon	1.5	Barbed Wire	1999
Wall Creek Riparian	Wall Creek	2.5	Barbed Wire	1978

Corrals and Holding Areas

The Tamarack Allotment has three permanent corral facilities used to load and unload cattle throughout the grazing season located on the following roads: 100, 2400, and 2406.

Environmental Effects

Alternative 1

Direct and Indirect Effects

Operations

Under this alternative, livestock grazing would be discontinued within the Analysis Area. The existing Term Grazing Permit would be cancelled under the time period provisions of FSH 2209.13 and no new Term Grazing Permits would be issued. Range improvements, including fences and water developments, would be removed. This alternative includes the loss of both professional rangeland management and permittee awareness of on-the-ground conditions within the project area. With a decreased emphasis on management of the area, trespass and other unauthorized uses would probably

go unnoticed. The Tamarack Allotment would be permanently closed by a separate decision signed by the Forest Supervisor.

Upland Vegetation

Upland vegetation conditions would be less likely to change where they are already in good condition, i.e. mid to late seral status. Vegetation composition would slowly change and would be dominated by late seral grasses; shrubs and forbs would decrease. In vegetation types where conifers are a component, understory shrubs and grasses would continue to decline as canopies close, except in areas where timber management, prescribed fire or a wildfire occurs. Shrub communities without fire or other disturbance regimes would gradually move toward a predominance of shrubs over grasses and forbs. Improvement in upland plant communities may occur at a rate faster than under Alternatives 2 and 3.

Riparian Vegetation

The elimination of livestock grazing would have no change in riparian areas that have been fenced to exclude livestock. Riparian areas that are currently not fenced would see the most significant improvement. These areas with the absence of grazing would increase the amount of riparian vegetation (grasses and sedges) and would increase riparian shrub canopy cover where shrubs currently exist and have the potential for expansion. In studies of streams where livestock use has been excluded from riparian areas, recovery of riparian habitat has occurred in 4 to 8 years depending on the site location and measure of riparian and stream channel recovery (Skovlin, 1984).

Under the No Grazing Alternative, riparian vegetation conditions would be maintained or would improve, meeting the Forest Plan/PACFISH goals and objectives. Riparian vegetation communities with a low or mid ecological status will improve. Sites at a high or late ecological status would be maintained with successional changes driven by other disturbance processes. Improvement would occur at a rate faster than that predicted for Alternatives 2 and 3; however, it could be decades before some plant communities reach high or potential conditions. Some streams with lower gradients and wetland riparian potential would become lined with tall sedges. In areas where roads, culverts, or other structures are impacting streams and associated riparian vegetation, improvements would be less likely without active restoration. Conifer encroachment into riparian communities would continue if fire or some other vegetation manipulation practice does not occur. Canopy cover of riparian shrubs would be expected to increase with the implementation of the No Grazing Alternative.

Alternative 2

Direct and Indirect Effects

Operations

Under Alternative 2 livestock grazing would continue within the Tamarack Analysis Area as described in Chapter 2. The existing Term Grazing Permits would be reauthorized to graze 209 cattle from May 1st through September 15th. Cattle would graze under the current management described above. Range improvements would continue to be maintained annually. Allotments would continue to be managed and monitored by rangeland specialists and the permittees. Forest Plan/PACFISH objectives (or other policies) would continue to be implemented on the Tamarack Allotment. Livestock trespass on the Tamarack Allotment would continue to be addressed using the Forest Service administrative process under all action alternatives.

Upland Vegetation

Upland vegetation conditions would continue to improve under Alternative 2. Current and approved monitoring methodologies will continue to be used to evaluate upland plant communities within the allotment under all action alternatives.

Riparian Vegetation

The action alternatives would continue to manage riparian areas to improve conditions and to meet Forest Plan/PACFISH riparian management objectives. The current grazing strategy would continue to improve riparian vegetation on streams and increase riparian shrub cover where the potential exists.

Alternative 3

Direct and Indirect Effects

Operations

Under this action alternative, all operations would have the same effects as Alternative 2, but at a slightly faster rate of improvement (habitat would move from a lower ecological state to a higher ecological state in a shorter amount of time) with the construction of additional riparian fences and water developments described in Chapter 2.

Upland Vegetation

Upland vegetation would experience similar effects to those in Alternative 2, but at a slightly faster rate of improvement (habitat would move from a lower ecological state to a high ecological state in a shorter amount of time). Improving livestock distribution on the uplands would maintain and improve upland vegetation on the allotment. Improving the distribution of livestock on a pasture would equate to less localized impacts in areas that may be more sensitive to livestock grazing effects.

Mitigation

Continue to monitor and inventory resource conditions on the uplands. Change annual livestock management strategies that do not maintain distribution of livestock within the allotment.

Riparian Vegetation

Riparian vegetation would exhibit the same as the effects as described under Alternative 2, but at a slightly faster rate of change. Improving livestock distribution in the uplands (upland water development) while fencing sensitive riparian habitat will improve riparian vegetation on the allotment. This would reduce localized impacts in areas that may be sensitive to livestock grazing effects. New riparian exclosures would accelerate recovery of the riparian vegetation within, while providing additional protection for ESA fish.

Cumulative Effects

Past, present and reasonably foreseeable future activities for the Tamarack Allotment are shown in Appendix B. The vegetation management activities in Riparian Habitat Conservation Areas (RHCA) were used to analyze cumulative effects to range. There have been 8,250 acres of past vegetation treatments in the Tamarack Allotment since the late 1970s with 2,100 of those acres occurring in riparian areas. These riparian area treatments represent 9 percent of the total allotment area, were conducted along perennial and intermittent streams, and included pre-commercial thinning, single-tree selection, overstory and partial tree removal. The Kahler Dry Forest Restoration Project is within the allotment and will be implemented over the next five years to ten years. This project overlaps spatially and temporarily with activities proposed in the Tamarack Allotment.

Currently, 581 acres in the Rim Rock Timber Sale (Kahler) have been commercially harvested and 419 acres of mechanical fuel treatments are proposed within the allotment. These treatments have and will occur outside of the RHCAs and are consistent with Forest Plan direction regarding native fish populations. Project design criteria and Best Management Practices (BMPs) meet Forest Plan standards per applicable PACFISH objectives and guides.

The Wall Creek Road and Watershed Improvement Project will be implemented in portions of Wall Creek Riparian Pasture, Stalling Butte, and Wildhorse pastures, within the Wall Creek (1707020208) watershed. The project will treat selected roads throughout the Wall Creek watershed that were identified and calculated as producing the highest sediment transport to stream systems using the Geomorphic Road Analysis and Inventory Package (GRAIP)(report on file Heppner Ranger District). Within the Tamarack allotment this includes: approximately 1.5 miles of road reconstruction and 3 culvert replacements. The project will implement the design criteria described in the Aquatic Restoration Biological Opinion Fish Habitat Restoration Activities in Oregon and Washington, CY 2007-CY2012, by National Marine Fisheries Service, Northwest Region, June 27, 2008, reference number 2008/03505.

There would be potential for sediment mobilization into creeks from culvert replacements and removals, road improvement projects, and any bank stabilization efforts under the Wall Creek Road and Watershed Improvement Project. However, these impacts would be at isolated locations and of short duration with long term benefits to stream and riparian ecosystem function. Additional beneficial effects for aquatic species would include long-term reduction in sedimentation to streams and improved fish passage. With the exception of hazard trees, there would be no removal of trees in RHCAs; stream temperature would not likely be affected. (See Hydrology and Fish sections for more information on stream temperatures).

Additional past, current and future ongoing actions in the analysis area include, ongoing riparian planting; approximately 4.4 miles of stream within the allotment have been planted (see hydrology report for further detail). Road and facility maintenance, noxious weed treatments, range improvements and grazing are also ongoing Forest activities.

There are ongoing timber and fuels activities within the project area, include Kahler Dry Forest Restoration Project. Other ongoing activities mentioned above overlap spatially and temporarily with the proposed activities on the Tamarack Allotment, but would be in isolated areas and of short duration. Riparian tree planting efforts and riparian weed treatments would have beneficial effects and can increase riparian vegetation diversity and composition while providing stream shade, cover and terrestrial input for fisheries. Active grazing management in surrounding allotments located within the same sub watersheds in the analysis area have similar project design criteria and BMPs and must meet Forest Plan standards per applicable PACFISH objectives and guides.

Alternative 1

Since cattle grazing would not be permitted under this alternative this proposal would have no cumulative effects. However, deer and elk would still have some grazing impacts on riparian vegetation communities and stream condition. The magnitude and duration of these impacts alone are unknown. Due to no permitted livestock grazing, this alternative would not incrementally add to past, present, or reasonably foreseeable future activities to cause cumulative effects to ESA-listed fish species, R6 sensitive fish, Salmon EFH and aquatic invertebrate species and their habitat within the Tamarack Allotment.

Alternatives 2 and 3

The action alternatives proposed for the Tamarack Allotment would not have the potential to result in any meaningful cumulative effects to water quality, stream flows, or the sediment regime that would affect sensitive or listed fish or sensitive aquatic invertebrates. This is due to the lack of substantial risk of direct or indirect effects associated with these alternatives. Alternatives 2 and 3 would have no measurable elements (either adverse or beneficial) that would incrementally add to any effects from other past, present, or reasonably foreseeable actions in the affected sub watersheds.

3.2 WILDLIFE

This section incorporates by references the wildlife biological evaluation (BE) and specialist report located in the project file. This report contains the data, methodologies, analysis, maps, reference, and technical documentation that the specialist relied on to reach the conclusions discussed in this section.

Scale of the Analysis

The scale of the analysis differs based on the species and habitats being considered. For this evaluation and analysis, the analysis area refers to Forest Service Lands within the Tamarack Allotment, unless otherwise noted. The primary cavity excavator group, pileated woodpecker, and American three-toed woodpecker (Management Indicator Species on the Umatilla) are assessed at the allotment scale. The viability of the pileated and three-toed woodpeckers and the primary cavity excavator group is also assessed at the Forest scale. The scale of analysis for the Rocky Mountain elk varies depending on standards and direction given by the Forest Plan. In the E1 Management Area, the scale of analysis is the subwatershed level; the portion of the E1 Management Area that lies within each subwatershed within the allotment would be assessed individually. For the C3 Management Area (Big Game Winter Range), the scale of analysis extends outside of the allotment boundary to the entire winter range (Monument Winter Range). The viability of this species is also assessed at the Forest scale. The scale of analysis for the American marten is the allotment area; the viability of this species is assessed at the Forest scale. The scale of analysis for Endangered, Threatened, and Sensitive species, and Neotropical Migratory Birds will be suitable habitat within the allotment, unless otherwise noted.

Regulatory Framework

The following laws apply to the Tamarack Allotment Project: Endangered Species Act, Migratory Bird Treaty Act, National Forest Management Act, and the Bald and Golden Eagle Protection Act. Additional policy direction relating to wildlife habitat and species is provided in the Umatilla National Forest Land and Resource Management Plan (LRMP), the Forest Service Manual (FSM 2670), and Executive Order 13186.

Analysis Method

The quantity and quality of wildlife habitat and the effects of the proposed activities on these habitats were assessed using:

- Notes, summaries, and other documents generated from field visits to the project area in 2005 and 2015. Professional knowledge of available habitat and wildlife within the analysis area was also utilized.
- Aerial photos.
- Coverages, data tables, graphics, maps and other information within and/or generated from information stored within the corporate Geographic Information System (GIS) database on the Heppner Ranger District and Umatilla National Forest.
- NRIS WILDLIFE database and Heppner Ranger District Wildlife Database (sighting reports and locations within the project area), including past rare furbearer surveys (1991- 1993) and peregrine falcon surveys (aerial and land surveys of potential nesting cliffs, surveyed in early 1990's).
- Vegetative information from the District Silviculturist (personal communications).
- Publications, reports, scientific papers and personal communications. Those utilized are documented and cited within the wildlife report and BE, as well as the EA.
- Where quantitative information is available, it is provided.

Management Indicator Species

The Forest Plan designates Management Indicator Species (MIS) to represent larger groups of animals associated with the major habitat types on the Forest. Habitat conditions for management indicator species must be managed to maintain viable populations (USDA 1990, page 2-9) at the forest or larger scale. MIS species for the Forest are presented in Table 3-2.

Table 3-2: Umatilla National Forest Management Indicator Species (USDA 1990, page 2-9).

Species	Habitat Description	Habitat Present in Analysis Area	Species Present in Analysis Area
Rocky Mountain elk	General forest habitat and winter ranges	Yes	Documented
Pileated woodpecker	Dead/down tree habitat (mixed conifer) in mature and old growth stands	Yes	Documented
American three-toed woodpecker	Dead/down tree habitat (lodgepole pine) in mature and old growth stands	Yes	Suspected
American marten	Mature and old growth stands at high elevations	Yes	Suspected
Primary Cavity Excavators (PCEs)	Dead/down tree (snag) habitat	Yes	Documented

Rocky Mountain elk, the pileated woodpecker, and a number of primary cavity excavators are known to occur in the analysis area. There have been no observations of either the marten or the three-toed woodpecker in the analysis area; however, small patches of source habitat for both of these species is present. Because source habitat is present, the effects of the proposed activities on these species and their habitat will be analyzed.

Rocky Mountain Elk

Affected Environment

The Rocky Mountain elk was selected as a MIS to be an indicator of general forest habitat and winter ranges. It is assumed that if good habitat is provided for elk and their population is maintained at some desired level, that adequate habitat is also being provided for other species that share similar habitat requirements (USDA 1990, page 2-9). Preferred habitat for elk consists of a mixture of forested and non-forested habitat types and a variety of forest structures that provide cover and forage for summer and winter usage (Thomas et al. 1979, USDA 1990).

Grasses constitute the majority of elk diets; however, elk will also utilize forbs, shrubs, lichens, and other vegetation, depending on the season of year and forage availability. Winter range habitat consisting of open grasslands and shrublands at low and mid elevations are required to carry elk through the critical winter period. They are primarily grazers, but also require dense forested stands for security and hiding cover. These stands are used for escaping predators (including humans) during periods of high disturbance, including hunting seasons. Recent research indicates that roads and off road recreation influence the distribution of big game (Rowland et al. 2004, Rowland et al. 2000, Wisdom et al. 2004). Elk generally avoid roads that are open to motorized traffic. The energy expenditure related to avoidance or fleeing from off road activity and road-related disturbance can reduce the body condition of elk and ultimately reduce the probability of surviving the winter (Cook et al. 2004). The current open road density within the Tamarack allotment is 1.9 mi/mi^2 which meets the forest-wide goal of 2 mi/mi^2.

Calving habitat is largely dependent on the availability of nutritious forage during the calving season (mid-May through mid-June) (Toweill and Thomas 2002). Calving generally occurs on transitional ranges with gentle topography where open foraging areas are adjacent to forested habitat (Toweill and Thomas 2002). Ground cover concealment, often in the form of shrubs, downed wood, or broken terrain, has been suggested by some to be important to elk in calving areas; however, this preference or dependence has not been quantified (Toweill and Thomas 2002). Anecdotal observations indicate that portions of the allotment are used by elk for calving.

The Tamarack Allotment lies within the Heppner big game management unit (BGMU). The elk population in this unit has been increasing slightly in the last several years, from a level of approximately 2,400 elk in 2006 to the current estimate of 5,400 elk in spring 2015 (ODFW 2015). The current estimated population level exceeds the management objective (MO) set by the Oregon Department of Fish and Wildlife (ODFW) for the unit, which is 5,000 elk. Elk herd composition has fluctuated in recent years within the unit. Low calf ratios that persisted throughout the early and middle portions of the decade have rebounded in recent years. Currently, calf ratios are approximately 22 calves per 100 cows in the Heppner unit (spring 2015 estimate). It is estimated that there are several hundred elk that summer and winter in the allotment. Elk summer range occurs throughout the middle and northern portions of the allotment at higher elevations. Summer range habitat includes those areas lying primarily within Forest Plan Management Area E1. Winter range (Forest Plan Management Area C3 – Monument Winter Range) occurs in the southern portion of the allotment at lower elevations. The Monument Winter Range is the largest winter range on the Forest. It stretches from the western portion of the Heppner Ranger District to the east end of the Western Route area on the North Fork John Day Ranger District covering approximately 61,000 acres of National Forest System lands. The analysis area includes 3,800 acres of the Monument winter range.

Forest Plan

The Umatilla Forest Plan (1990) establishes standards and guidelines for elk habitat for many of the management areas on the Forest. The standards include percent canopy closure, habitat effectiveness index (HEI) values, and open road density. The habitat effectiveness standard is generally assessed at the subwatershed scale for summer range habitats (E1) and over the entire winter range area in management area C3. Cattle grazing would have no impact on the quality or distribution of cover habitat in the allotment. Cattle grazing would also not change the open road density in the analysis area. Because there would be no effect on the constituent elements of the HEI equation, there will be no further analysis of the effects of grazing to HEI.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Elimination of grazing within the allotment would result in more forage being available year- round for elk. This would be especially important on winter range habitats where forage can be limited during portions of the year. Current monitoring data indicates that standards are currently being met throughout the allotment, and that forage is sufficient to support wild ungulates. As a result, the expected impact (positive) of eliminating grazing within the allotment on elk would be minor. In the absence of cattle (and associated avoidance of cattle by elk), elk may become more widely distributed through the allotment. Over time, riparian and upland shrub recruitment may increase in the absence of cattle grazing. As a result, potential elk calving habitat in riparian areas and winter foraging habitat quality would likely be improved.

Removal of existing boundary fence, pasture division fence, and riparian exclosure fences used to improve cattle distribution in the uplands would result in increased landscape permeability. Elk would be able to move across the landscape more easily with fences removed.

Elimination of grazing would also entail the removal of water sources specifically developed for cattle management. Removal of upland water sources would have a negative impact on the distribution of elk in the allotment. Elk would have to travel further to access water, or would have greater impacts on riparian habitat, as they would spend a greater portion of their time in these areas. Due to impacts associated with removal of water sources, the majority of developed water sources, particularly ponds, would be retained following elimination of grazing.

Forest Plan Consistency

This alternative would eliminate impacts to elk and elk habitat from cattle grazing. As a result, there would be a positive trend in habitat quality at the allotment scale, and to a much smaller degree, the Forest scale. At the Forest scale, there would be no short or long term population change resulting from the elimination of grazing in the Tamarack Allotment. Elimination of grazing would contribute toward meeting the management objectives of Oregon Department of Fish and Wildlife, which are well in excess of minimum viable populations. Thus, continued viability of Rocky Mountain elk is expected on the Umatilla National Forest, and hunting opportunities would be available at similar levels to those currently available in the Heppner Management Unit.

Alternative 2

Direct and Indirect Effects

This alternative would maintain current grazing management in the allotment, including stocking levels, season of use, number of pastures, and grazing rotation. Current research has shown that cattle grazing can affect habitat selection and distribution of elk in the summer (Coe et al. 2004). Elk were found to shift their use of available habitat in the summer when cattle were present; they were displaced (avoided cattle) from habitats normally selected for in the absence of cattle. There was more overlap in cattle and elk habitat use in the late summer, likely in response to forage availability. It is likely that this would continue to occur in the Tamarack Allotment in the future under this alternative. Due to the availability of habitat that cattle are unable or unwilling to access and the fact that cattle are not present in the entire allotment all of the time (during the grazing season), impacts to elk (nutrition, body condition) related to avoidance or other competitive interactions with cattle would continue to be minor, and the same as those that are currently occurring in the allotment.

Cattle grazing is not adversely affecting key big game use areas (migration corridors, calving/ fawning areas, winter range habitats, etc.) within the allotment. Cattle do not trample or otherwise affect habitat characteristics of migration corridors. Cover habitat (satisfactory and marginal) is not affected by the presence of or use by cattle. Research has found that fall conditioning of forage on winter range grassland habitat can substantially reduce available forage, but the nutritional value of remaining forage is higher when regrowth occurs after fall rains (Westenskow-Wall et al. 1994). If fall regrowth does not occur, livestock grazing can leave winter/early spring range with depleted forage reserves to carry the desired numbers of big game through the critical winter/early spring period. Pastures containing winter range habitat are grazed in the early and mid-season. Late season grazing does not occur in these areas; it would be restricted to the Wildhorse pasture. It is not expected that early and mid-season grazing would leave pastures deficient in forage quantity for wintering elk.

Winter ranges in northeast Oregon are generally forage-quality limited rather than forage-quantity limited (Clark et al. 2000). Moderate levels of late spring and early summer grazing of winter range grasslands (primarily bluebunch wheatgrass and Idaho fescue) has been found to improve the quality

(crude protein and digestibility) of winter range forage for deer and elk (Clark et al. 1998, Clark et al. 2000). The improvement in forage quality was more evident under moderate grazing (with a goal of 50 percent utilization) than light grazing (Clark et al. 2000). These improvements in forage quality could have a substantial impact on the nutritional status of wintering elk. Late spring and early summer grazing would occur in the Little Tamarack and Stalling Butte pastures under this alternative. Approximately 37 percent of these pastures are considered winter range habitat (including management areas C3 and several C1 old growth areas). Cattle stocking levels within these pastures are relatively low when compared to historic grazing levels; currently, stocking ranges from 21 to 24 acres per head month in these pastures. The reduction in the standing crop of herbaceous forage that would occur as a result of grazing is not expected to limit forage for wintering elk.

Monitoring within the Tamarack allotment indicates that Forest Plan standards are being met. There are five Condition and Trend plots in the allotment. All of these plots are located in upland areas. Monitoring of vegetation and soil conditions at this site indicates that rangelands are in a satisfactory condition, and have stable or upward trends in vegetation and soil condition.

Desirable changes in vegetation and soil condition have been noted at this site. Stubble height monitoring at the end of the grazing season shows that PACFISH standards (incorporated into the Forest Plan through amendment) are being met at Key Areas within the allotment. Three Key Areas have been established in the allotment. These Key Areas were established in locations where excessive forage utilization or resource conflicts have occurred in the past. Past changes in the grazing system (rotation) and decreased stocking within the allotment have contributed to the attainment of these standards. Condition and Trend plot monitoring and attainment of stubble height standards indicates that Forest Plan standards for allowable forage utilization (percent forage removed by weight) are being met within the allotment. This indicates that adequate forage is being allocated to wildlife (elk and deer) to meet big game management objectives. Consistent attainment of standards indicates that forage quantity would not be limited on winter range habitat. Cattle grazing has the potential to impact riparian shrubs, and subsequently browse for elk. Research in northeast Oregon has shown that elimination of cattle grazing in a pasture showing a utilization level of 60 percent to 65 percent resulted in significant increases in crown area, height, crown volume, stem diameter, and biomass of riparian shrubs, both outside and inside big game exclosures (Case and Kauffman 1997). Upland shrub monitoring has not occurred in the Tamarack Allotment; cattle utilization of upland shrubs such as a mountain mahogany and bitterbrush has not been noted, likely due to the availability of herbaceous vegetation and forbs where these shrubs are present, and the timing of cattle grazing in these areas. If winter ranges were grazed in the late season, there would be a potential for upland shrub browse by cattle. In the Tamarack Allotment, late season grazing of winter ranges would not occur. Available forage would be sufficient to support the elk population within the allotment.

Cattle grazing is not adversely affecting calving areas within the allotment. Cattle grazing under the proposed May 1 turn-on date would not interfere with the elk calving habitat. Range structural improvements (fences, ponds, spring developments, etc.) are not adversely affecting the elk population in the allotment. Barbed wire allotment and pasture division fences do not constitute barriers to the movement of big game animals within or outside the allotment. Elk are able to pass over or under barbed and smooth wire fences relatively easily.

Cumulative Effects

Past activities and events in the allotment that affected elk and elk habitat include timber harvest, road construction, road closures (Access and Travel Management), prescribed fire, water developments, and livestock grazing. Timber harvest has affected forest structure and composition, reducing the amount of cover habitat in the analysis area. Timber harvest has also fragmented habitat, creating a

mosaic of forested stands and man-made openings. Conversely, the amount of foraging habitat for big game has increased in response to past harvest and insect and disease events. Road construction associated with timber harvest increased road densities and disturbance within the analysis area, although overall open road density is still relatively low.

Prescribed fire within the analysis area has improved forage habitat quality and quantity by reducing encroachment of conifers into foraging habitat and invigorating forage; the effects of this activity were largely short-lived. Generally, prescribed fire had no impact on cover habitat for elk. Historic livestock grazing (sheep and cattle) negatively impacted range condition. Livestock altered the structure and composition of upland and riparian habitat through repeated overgrazing of rangelands. Water developments and pond creation have reduced the distance wildlife must travel to find water and improved the distribution of livestock in the allotment by drawing them away from riparian habitats. Past activities have resulted in the current condition of elk habitat in the allotment.

Present activities, actions, and events that affect elk and elk habitat include cattle grazing. Current grazing in the allotment is not adversely affecting rangeland condition or adversely affecting wild ungulate (elk) populations. Changes in grazing systems, season of use, stocking, and species grazed (cattle) have accounted for improved range condition. Livestock grazing still has the potential to compete with big game for forage habitat, particularly when forage is scarce (late summer/early fall). Current allotment management plans balance livestock utilization with big game management objectives, resulting in a shared utilization of the forage resource.

Timber harvest proposed under the Kahler Dry Forest Restoration Project is the only reasonably foreseeable future activity with the potential to cumulatively affect elk and elk habitat. The Kahler Dry Forest Restoration Project would commercially thin a portion of the Tamarack Allotment. These activities would reduce elk cover and increase elk vulnerability in the short and mid-term. Elk would be more likely to move off National Forest lands and for longer periods of time than currently occurs. This project would close several roads, partially compensating for cover loss and increased vulnerability.

When the expected effects of this alternative are combined with the residual and expected effects of past, present, and future actions, activities, and events in the analysis area, there would be no adverse cumulative impact on elk or elk habitat. Maintenance of the existing grazing system, numbers, and season of use would not contribute to past reductions in habitat quality through grazing. Monitoring data indicates that current grazing is not limiting either the quality or quantity of elk forage in the allotment. Grazing is also not affecting cover habitat or road densities, several factors that determine the potential effectiveness of elk habitat.

Forest Plan Consistency

Under this alternative, the current grazing system would be maintained in the Tamarack Allotment. It is expected that grazing under the current season of use and numbers in the Tamarack Allotment would not adversely impact this species or its habitat. As a result, there would be no negative habitat trend (reduction in cover, increase in open roads, etc.) at the allotment scale or the Forest scale. At the Forest scale, there would be no short or long-term population change resulting from implementation of this alternative. While cattle have the potential to impact forage availability and compete with elk to some degree, grazing under this alternative would contribute toward meeting the management objectives of the Oregon Department of Fish and Wildlife, which are well in excess of minimum viable populations. Thus, the continued viability of elk is expected on the Umatilla National Forest, and hunting opportunities would be available at similar levels to those currently available in the Heppner Management Unit.

Alternative 3

Direct and Indirect Effects

The direct and indirect effects of this alternative would be virtually the same as those described under Alternative 2. Additional fencing in Lost Creek and Dark Canyon and up to 9 new water developments would be constructed under this alternative. The design of these fences would allow for the free movement of elk within the management zone (bottom wire no less than 18 inches above the ground, while total height would not exceed 38 inches; see Appendix A). This activity would exclude cattle and allow access for elk and other wild ungulates. Construction of water sources away from the 24 Road would reduce vulnerability of elk at these locations; water would be available to both wildlife and domestic ungulates.

Cumulative Effects

When the expected effects of this alternative are combined with the residual and expected effects of past, present, and future actions, activities, and events in the analysis area, there would be no adverse impact on elk or elk habitat. The activities proposed under this alternative would contribute to a reduction in potential impacts associated with cattle grazing in the Tamarack Allotment. While largely maintaining existing management in the allotment, the additional activities proposed in this Alternative (construction of hard fence along streams and water developments) would aid in reversing past cattle impacts on riparian habitat condition and other important elk habitat areas.

Forest Plan Consistency

Under this alternative, the current grazing system would be largely maintained in the Tamarack Allotment. Actions would be implemented that would improve management in the allotment and reduce impacts to riparian habitat. As a result, there would be no negative elk habitat trend at the allotment scale or the Forest scale. At the Forest scale, there would be no short or long term population change to elk resulting from implementation of this alternative. While cattle have the potential to impact forage availability and compete with elk to some degree (albeit at a slightly lower level than Alternative 2), grazing under this alternative would contribute toward meeting the management objectives of the Oregon Department of Fish and Wildlife, which are well in excess of minimum viable populations. Thus, the continued viability of elk is expected on the Umatilla National Forest, and hunting opportunities would be available at similar levels to those currently available in the Heppner Management Unit.

Primary Cavity Excavators

Affected Environment

Primary cavity excavators (PCE) include bird species that create holes for nesting or roosting in live, dead, or decaying trees. The Primary Cavity Excavator group (not individual species of cavity excavating birds) was selected as MIS to be an indicator of dead/down tree (snag) habitat on the Forest. It is assumed that if dead wood (snag) habitat is provided for the Primary Cavity Excavator group, that adequate habitat is also being provided for species that require cavities for some portion of their life cycle. Habitat for these species consists of dead and down wood features in numerous structural stages and compositions, ranging from post-fire stands, to open juniper and ponderosa pine woodlands, and at the highest elevations subalpine fir and Engelmann spruce forest. Primary cavity excavators typically feed on forest insects, and can regulate populations of these tree- feeding insects.

Environmental Consequences

Alternative 1

Direct, Indirect, and Cumulative Effects

Under this Alternative, cattle grazing would be eliminated in the Tamarack Allotment. There would be no direct, indirect, or cumulative impacts on this group of species.

Alternatives 2 and 3

Direct and Indirect Effects

Cattle grazing would not affect the quantity or quality (structure and composition of forested stands) of nesting and foraging habitat for primary cavity excavating birds. Although cattle use areas where snags are present, they do not affect the density or distribution of these habitat components. Cattle do not consume or otherwise impact individual snags or snag densities over larger land areas.

Cattle grazing does not affect downed wood or downed wood densities; cattle do not consume or otherwise affect this habitat feature. Fence maintenance and construction activities proposed under these alternatives have the potential to affect a very small number of snags. Typically, snags are allowed to fall naturally and improvements are repaired annually as a requirement of the permittee's term grazing permit. While an occasional snag may be felled, it would be considered uncommon. This activity would not affect the suitability of primary cavity excavator habitat in the allotment or affect the availability of snags in the allotment. Due to the fact that a very small number of snags would be potentially impacted, the impact of this activity is expected to be negligible; it would not be measurable at the allotment scale.

Cumulative Effects

Potential felling of a small number of snags within the allotment to protect range improvements would add to past reductions in snags within the allotment resulting from timber harvest, firewood gathering, danger tree felling, and other activities, actions, and events. Because this impact would be negligible (a very small number of snags) and would not be measureable at the scale of the allotment, the cumulative impact on Primary Cavity Excavators and their habitat would be negligible under these alternatives.

Forest Plan Consistency (All Alternatives)

The proposed alternatives (1, 2, and 3) would not result in population level impacts or a negative habitat trend at either the allotment or Forest scale. Impacts to snag habitat are expected to be negligible because only a small number of snags would potentially be affected. Therefore, the proposed activities under Alternatives 1, 2, and 3 would not affect the viability of the Primary Cavity Excavator group at the Forest scale. The continued viability of the Primary Cavity Excavator group is expected on the Umatilla National Forest under all alternatives.

Pileated Woodpecker

Affected Environment

The pileated woodpecker was selected as a MIS to be an indicator of dead and downed tree habitat in mature and old growth mixed conifer stands. It is assumed that if good habitat is provided for pileated woodpeckers and their population is maintained at some desired level, that adequate habitat is also being provided for other species that share similar habitat requirements (USDA 1990, page 2-9).

Environmental Consequences

Alternative 1

Direct, Indirect, and Cumulative Effects

Under this Alternative, cattle grazing would be eliminated in the Tamarack Allotment. There would be no direct, indirect, or cumulative impacts on the pileated woodpecker.

Alternatives 2 and 3

Direct and Indirect Effects

Although cattle may use pileated woodpecker source habitat for foraging and other activities, they do not affect the density or distribution of dead wood habitat or affect the composition or structure of source habitat. Range structural improvements (fences, spring developments, ponds, etc.) are not measurably affecting this species or habitat features (large snags and green trees) required by this species. While an occasional snag may be felled during fence maintenance (and new fence construction under Alternative 3), this would be uncommon (snags are generally allowed to fall naturally and improvements are repaired annually), and the impact negligible; it would have no measureable impact on the pileated woodpecker or special habitat features (large snags) required by this species. Management activities associated with grazing (riding, salting, moving cattle between pastures, etc.) are also not affecting this species or source habitat.

Cumulative Effects

Potential felling of a small number of snags within the allotment to protect range improvements would add to past reductions in snags within the allotment resulting from timber harvest, firewood gathering, danger tree felling, and other activities, actions, and events. Due to the fact that this impact would be negligible (a very small number of snags) and would not be measureable at the scale of the allotment, the cumulative impact on the pileated woodpecker and its habitat would be negligible under all alternatives.

Forest Plan Consistency (All Alternatives)

The proposed alternatives (1, 2, and 3) would not result in population level impacts or a negative habitat trend at either the allotment or Forest scale. As a result, the proposed activities under Alternatives 1, 2, and 3 would not affect the viability of the pileated woodpecker at the Forest scale. The continued viability of the pileated woodpecker is expected on the Umatilla National Forest under all alternatives.

Northern Three-Toed Woodpecker

Affected Environment

The American three-toed woodpecker (*Picoides dorsalis*) (formerly known as the northern three- toed woodpecker) was selected as a management indicator species in the Forest Plan to represent dead and down tree habitat in mature and old growth lodgepole pine stands (Table W-09, wildlife report). It is assumed that if good habitat is provided for three-toed woodpeckers and their population is maintained at some desired level, that adequate habitat is also being provided for other species that share similar habitat requirements (USDA 1990, page 2-9). Preferred habitat for the American three-toed woodpecker includes late successional, cold and moist forest types (lodgepole/spruce/subalpine fir) with high standing-wood density (Marshall et al. 2003).

Environmental Consequences

Alternative 1

Direct, Indirect, and Cumulative Effects

Under this Alternative, cattle grazing would be eliminated in the Tamarack Allotment. There would be no direct, indirect, or cumulative impacts on the American three-toed woodpecker.

Alternatives 2 and 3

Direct and Indirect Effects

Although cattle may use American three-toed woodpecker source habitat for foraging and other activities, they do not affect the density or distribution of dead wood habitat or affect the composition or structure of source habitat. Range structural improvements (fences, spring developments, ponds, etc.) are not measurably affecting this species or habitat features (large snags and green trees) required by this species. New improvements would also not impact source habitat for this species. Management activities associated with grazing (riding, salting, moving cattle between pastures, etc.) are also not affecting this species or source habitat. While an occasional snag may be felled during fence maintenance (and new construction under Alternative activities, this would be uncommon (snags are generally allowed to fall naturally and improvements are repaired annually), the impact negligible, and would have no measureable impact on the American three-toed woodpecker or special habitat features (snags in burned stands and high elevation conifer stands) required by this species.

Cumulative Effects

Potential felling of a small number of snags within the allotment to protect range improvements would add to past reductions in snags within the allotment resulting from timber harvest, firewood gathering, danger tree felling, and other activities, actions, and events. Due to the fact that this impact would be negligible (a very small number of snags) and would not be measureable at the scale of the allotment, the cumulative impact on the American three-toed woodpecker and its habitat would be negligible under these alternatives.

Forest Plan Consistency (All Alternatives)

The proposed alternatives (1, 2, and 3) would not result in population level impacts or a negative habitat trend at either the allotment or Forest scale. As a result, the proposed activities under Alternatives 1, 2, and 3 would not affect the viability of the American three-toed woodpecker at the Forest scale. The continued viability of the American three-toed woodpecker is expected on the Umatilla National Forest under all alternatives.

American Marten

Affected Environment

The American marten was selected as a MIS to be an indicator of mature and old growth stands at high elevations. It is assumed that if good habitat is provided for American marten and their population is maintained at some desired level, that adequate habitat is also being provided for other species that share similar habitat requirements (USDA 1990, page 2-9).

American marten are typically associated with late-seral coniferous forests with closed canopies, large trees, and abundant snags and down woody material (Zielinski et al. 2001). This species has not been observed in the Tamarack Allotment; it is unlikely to occur due to the limited amount and distribution of habitat within the allotment.

Environmental Consequences

Alternative 1

Direct, Indirect, and Cumulative Effects

Under this Alternative, cattle grazing would be eliminated in the Tamarack Allotment. There would be no direct, indirect, or cumulative impacts on the American marten.

Alternatives 2 and 3

Direct, Indirect, and Cumulative Effects

Although cattle may use American marten source habitat for foraging and other activities, they do not affect the density or distribution of dead wood habitat or affect the composition or structure of source habitat. Due to high down wood densities in suitable habitat, cattle would generally avoid these areas. Range structural improvements (fences, spring developments, ponds, etc.) are not affecting this species or habitat features required by this species. New improvements would also not impact source habitat for this species. Management activities associated with grazing (riding, salting, moving cattle between pastures, etc.) are also not affecting this species or habitat. Under these alternatives, there would be no direct or indirect impacts on this species. As a result, there would also be no cumulative impacts on this species and its habitat.

Forest Plan Consistency (All Alternatives)

The proposed Alternatives (1, 2, and 3) would not result in population level impacts or a negative habitat trend at either the allotment or Forest scale. As a result, the proposed activities under Alternatives 1, 2, and 3 would not affect the viability of the American marten at the Forest scale. The continued viability of the American marten is expected on the Umatilla National Forest under all of the proposed alternatives.

Threatened, Endangered, Proposed, Candidate, and Sensitive Species

This section describes and analyzes any impacts to listed and endangered species, as described in the Endangered Species Act.

A species list was requested from the US Fish and Wildlife Service on March 31, 2016 for the Tamarack Allotment (USDI 2016) in order to identify which endangered, threatened, de-listed, candidate, and proposed species, if any, may be present in the project area. This species list indicated that there is a potential for the gray wolf (Endangered) to occur in the analysis area. Review and consideration of the species list provided by the US Fish and Wildlife Service for the Tamarack Allotment Management Plan satisfies direction provided in FSM 2671.44 for coordination (consultation) with other federal agencies.

Sensitive species are those identified by the Pacific Northwest (Region 6) Regional Forester as needing special management to meet Forest Service Manual direction, Department regulations, and National Forest Management Act obligations and requirements (USDA 2015). Sensitive Species are those for which population viability is a concern, as evidenced by: 1. Current or predicted downward trends in population numbers or density; or, 2. Current or predicted downward trends in habitat capability that would reduce a species' existing distribution (FSM 2670.5). The Forest Service is required to manage National Forest System lands to maintain viable populations of all native and desired nonnative wildlife, fish, and plant species (including Sensitive Species) in habitats distributed throughout their geographic range on National Forest System lands (FSM 2670.22). Forest Service activities are required to be conducted to avoid actions that may cause a species to become threatened or endangered as a result of Forest Service actions (FSM 2670.12, 2670.22).

Sensitive Species include those that have been documented (valid, recorded observation) or are suspected (likely to occur based on available habitat to support breeding pairs/groups) to occur within or adjacent to the Umatilla National Forest boundary. General Forest Service direction for sensitive species is summarized below (FSM 2670.32):

- Assist states in achieving their goals for conservation of endemic species.
- As part of the NEPA process, review programs and activities using a biological evaluation, to determine their potential effect on sensitive species.
- Avoid or minimize impacts to species whose viability has been identified as a concern. If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole.
- Establish management objectives in cooperation with states when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions.

Federally listed and sensitive species with a potential to occur on the Umatilla National Forest are found in Table 3-3 This determination is based on observation records, vegetative and wildlife species inventory and monitoring, published literature on the distribution and habitat utilization of wildlife species, information provided by the US Fish and Wildlife Service, and the experience and professional judgment of wildlife biologists on the Umatilla National Forest.

Table 3-3: Federally ESA listed and Region 6 Sensitive Species with a potential to occur on the Umatilla National Forest

Common Name	Scientific Name	Status[2]	Occurrence[1] on the Umatilla National Forest	Occurrence[1] in the Tamarack Analysis Area
American peregrine falcon	*Falco peregrinus anatum*	SEN	S	N
North American wolverine	*Gulo*	CAN	S	H
Canada lynx	*Lynx canadensis*	THR	D	N
Columbia spotted frog	*Rana luteiventris*	SEN	D	K
Gray wolf[3]	*Canis lupus*	END	D	H
Rocky Mountain tailed frog	*Ascaphus montanus*	SEN	D	N
Lewis' woodpecker	*Melanerpes lewis*	SEN	D	H
Bald eagle	*Haliaeetus leucocephalus*	SEN	D	N
Townsend's big-eared bat	*Corynorhinus townsendii*	SEN	D	N
Upland sandpiper	*Bartramia longicauda*	SEN	S	N
White-headed woodpecker	*Picoides albolarvatus*	SEN	D	H
Fir pinwheel	*Radiodiscus abietum*	SEN	D	N

Common Name	Scientific Name	Status[2]	Occurrence[1] on the Umatilla National Forest	Occurrence[1] in the Tamarack Analysis Area
Johnson's hairstreak	*Callophrys johnsoni*	SEN	D	H
Intermountain sulphur	*Colias christina pseudochristina*	SEN	S	H
Fringed myotis	*Myotis thysanodes*	SEN	D	H
Western bumblebee	*Bombus occidentalis*	SEN	D	H

[1] S = Suspected, likely to occur based on habitat availability to support breeding pairs/groups within Forest boundary; D = Documented, reliable, recorded observation within the Forest boundary; K = Species known to occur within or near project area; H = Habitat present in project area; N = Habitat not present in project area.

[2] SEN = Sensitive species in USDA Forest Service Region 6; THR = ESA listed as Threatened; END = ESA listed as Endangered; CAN = Candidate for listing under the ESA.

[3] Currently, the gray wolf is considered a Region 6 Sensitive Species on that portion of the Umatilla National Forest east of State Highway 395 and federally listed as Endangered west of State Highway 395. The gray wolf is considered as Endangered in the Tamarack Allotment. No Critical Habitat has been proposed or designated in the Northern Rocky Mountains or any portion of Oregon (USDI 1978, USDI 2009a).

The following species are either known to occur in the project area, are suspected to occur in the project area, or suitable habitat is present in the project area: North American wolverine, gray wolf, Lewis' woodpecker, white-headed woodpecker, Columbia spotted frog, intermountain sulphur, Johnson's hairstreak, fringed myotis, and the western bumblebee. The other species listed in Table 3-3 would not be affected by the proposed activities because they are not known or suspected to occur in the project area or suitable habitat is not present in the project area. As a result, there would be no impact on these TES wildlife and invertebrate species: peregrine falcon, Rocky Mountain tailed frog, Canada lynx, bald eagle, Townsend's big-eared bat, upland sandpiper, and fir pinwheel.

Gray Wolf (Endangered)

Affected Environment

Gray wolves (*Canis lupus*) are the largest wild members of the dog family (Canidae). The wolf is a habitat generalist inhabiting a variety of plant communities, typically containing a mix of forested and open areas with a variety of topographic features (Verts and Carraway 1998). Currently, the gray wolf is federally listed as Endangered west of State Highway 395. The Tamarack Allotment is entirely west of State Highway 395; therefore, the conservation status of the gray wolf in this allotment is "Endangered." No critical habitat has been proposed or designated in the project area.

The gray wolf was on the species list provided by the US Fish and Wildlife Service identifying listed species with a potential to occur in the Tamarack Allotment area. However, the Tamarack Allotment is not currently an area of known wolf activity. No denning or rendezvous sites are known to occur on the District. The nearest area of known wolf activity is approximately 30 miles to the northeast.

The number of wolf packs using portions of the Umatilla NF has increased steadily over the past 5 years. Currently there are 8 known wolf packs on the forest. It is reasonable to conclude that at some point in the future wolves are likely to be present within the allotment (Berkley and Hickman 2015). A Programmatic Biological Assessment for wolves is being drafted cooperatively with USFWS to address consultation requirements of future projects.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

This alternative would eliminate grazing in the Tamarack Allotment. Wolves are not known to occur in the allotment, therefore the presence or absence of grazing would have no direct, indirect, or cumulative effects on this species.

Alternatives 2 and 3

Direct and Indirect Effects

Because wolves are not currently known to occur in the Tamarack allotment, there would be no negative interactions between this species and cattle grazing operations. Grazing would not affect the suitability of potential wolf habitat in the analysis area or the potential for wolves to disperse into or through the allotment. No changes in road access would occur and cattle are not adversely affecting habitat for wolf prey species (see elk section). If wolf presence in the area is confirmed, the Oregon State Wolf plan (ODFW 2010) would be followed, Section 7 ESA consultation with the USFWS would be initiated and appropriate conservation measures would be implemented. For these reasons, there would be no direct or indirect effects to this species under Alternatives 2 and 3.

Cumulative Effects

Under Alternatives 2 and 3, there would be no direct or indirect effects on this species. There would therefore be no cumulative effects on the gray wolf under these alternatives.

Determination of Effects and Rationale (Alternatives 1, 2, and 3)

Under Alternatives 1, 2, and 3 there would be no effect to the gray wolf. The rationale for this determination is as follows:

- This species is not currently known to occur on or near the allotment.
- Denning and rendezvous sites are not present in the allotment.
- Grazing would not impact the suitability of habitat for the gray wolf.
- Open road densities would not be affected under any of the proposed alternatives.
- Grazing is not currently, nor would it in the future, measurably impact big game populations in the allotment or the larger Heppner Ranger District. By meeting Forest Plan and other monitoring standards, management would ensure that sufficient forage is provided for wild ungulates in the allotment.

North American Wolverine (Sensitive/Proposed Threatened)

Affected Environment

The current range of wolverines in the U.S. includes the North Cascades of Washington, the northern Rocky Mountains of Idaho, Wyoming, Montana, and eastern Oregon, the southern Rocky Mountains of Colorado and Wyoming, and the Sierra Nevada of California. The northern Rocky Mountains, including the Blue Mountains of eastern Oregon, are considered the southern portion of the species range. Wolverines require high elevation alpine forest with deep persistent snow (Aubrey et al. 2007, Copeland et al. 2010). Most year-round habitat is found near the tree line in conifer forests, and in cirque basins and avalanche chutes that have food sources such as marmots, voles, and carrion (Inman et al. 2011

The Umatilla National Forest contains very little alpine or high elevation tree line habitat and provides relatively small areas with persistent snow cover in comparison to areas with known wolverine populations. However, the forest may provide foraging opportunities for individuals. Anecdotal sightings have been reported on the Umatilla National Forest over the years, although none of them could be verified. Various winter track surveys have been conducted intermittently, including snow tracking surveys on the Heppner Ranger District between 1991 and 1994, and 2010. No confirmed tracks have been detected during these surveys. There are also ongoing efforts to detect American marten and wolverine on the forest with cameras, but not on the scale that is necessary to complete a systematic survey. The nearest known area of confirmed wolverine activity is in the Wallowa Mountain Range, approximately 90 miles northeast of the Tamarack Allotment.

The Tamarack Allotment does not contain contiguous subalpine forest types, alpine habitat, open rocky slopes, cirque basins, or avalanche chutes. There is no "treeline," high elevation alpine forest, or open rocky slopes that would support deep late spring snow for wolverine reproduction in the Tamarack Allotment. As the wolverine is a wide-ranging species, higher-elevation forested stands within the Tamarack Allotment may provide low quality foraging habitat for individual wolverine.

This species is currently a Region 6 Sensitive Species and is proposed for listing as Threatened under the Endangered Species Act. Wolverine are not currently known or suspected to occur in the project area. A wolverine could possibly pass through the area, but the likelihood of wolverine presence during project activities is extremely small.

Environmental Consequences

All Alternatives

Direct and Indirect Effects

Because wolverine are dependent on deep persistent snow cover that persists into the month of May for successful denning, the primary threat is from habitat and range loss due to climate warming (FWS 2013). Livestock grazing is not considered a threat to this species (FWS 2013).

Continued grazing in the allotment would not affect the quality of higher-elevation forested stands potentially used for foraging. Grazing under these alternatives would not impact potential prey populations within the allotment or larger area. The quantity and quality of forage would continue to meet the needs of potential prey in the future.

Activities proposed in the Tamarack Allotment would not preclude or change potential wolverine movement through the area. The availability of food items such as small mammals and dead ungulates would not change through implementation of any of the proposed alternatives. Since denning is not expected in the area, there would be no effects to reproduction.

Cumulative Effects

Under all of the alternatives, there would be no direct or indirect effects on this species, potential foraging or denning habitat, or potential movement into the allotment. There would therefore also be no cumulative effect on the North American wolverine under these alternatives.

Determination of Effects and Rationale

It has been determined that grazing under all of the proposed alternatives would have no effect on the North American wolverine. The rationale for this determination is as follows:

- The wolverine is not currently known to occur in the Tamarack Allotment or on the District.
- There would be no direct, indirect, or cumulative effects on this species or potential habitat through implementation of Alternatives 1, 2, or 3 because it is not currently known to occur in the allotment and this activity has not been identified as a threat to this species.
- Habitat suitability would not be altered by continued grazing at the same stocking levels and season of use as current grazing (Alternative 2 and 3) or elimination of grazing in the Tamarack Allotment (Alternative 1).

Columbia Spotted Frog (Sensitive)

Affected Environment

Columbia spotted frogs are highly aquatic and rarely found far from permanent water. They also utilize intermittent streams and meadows in the spring. They occupy the sunny, vegetated margins of streams, lakes, ponds, spring complexes, and marshes. Columbia spotted frogs are mobile; they seasonally move between hibernacula (overwintering sites), breeding habitat, and wet meadow/riparian foraging areas (Bull and Hayes 2002). Some Columbia spotted frogs will remain and overwinter in breeding habitat if conditions are ideal. Hibernacula are typically ponds, slow-moving streams, and springs where water surrounding the frog does not freeze and oxygen levels are adequate (Tait 2007, Bull and Hayes 2002). Breeding occurs in shallow (<60 cm) emergent wetlands such as riverine side channels, beaver ponds, springheads, and the wetland fringes of ponds, small lakes, and livestock ponds. Water levels must persist until eggs are hatched and tadpoles transform. Adults exhibit strong fidelity to breeding sites, with egg deposition typically occurring in the same areas in successive years. Foraging takes place in all types of permanent or ephemeral wetland habitats, including meadows, stream margins, ponds, ditches, and intermittent habitats; these areas constitute movement corridors between breeding and hibernation sites.

Because frogs are especially vulnerable to predation during summer foraging, some level of overhead plant cover is optimal. NatureServe ranks the Columbia spotted frog as *apparently secure* (N4) at the National and Global scale and *imperiled/vulnerable* (S2/S3) at the state (Oregon) level (NatureServe 2012). The Great Basin subpopulation is ranked as *imperiled* (T2) due to a high risk of extinction due to very restricted range, very few populations, steep population declines, and other factors. Columbia spotted frogs on the Heppner Ranger District are believed to be more closely affiliated with the Northern Distinct Population Segment of the species (Tait 2007) which is not considered imperiled. This has yet to be confirmed with DNA testing.

The Columbia spotted frog is known to occur in the Tamarack Allotment. Surveys for this species occurred in 2006 in a portion of the allotment. During these surveys, spotted frogs and evidence of breeding were observed at several sites in the allotment. Larger streams would likely be used by adults for summer foraging habitat. Marshy areas along these streams may be used for breeding during the spring. Perennial stock ponds in the Tamarack Allotment would generally be considered suitable breeding habitat for the Columbia spotted frog if aquatic vegetation is present.

Environmental Consequences

Alternative 1

Direct, Indirect, and Cumulative Effects

Under this alternative, grazing would be eliminated in the Tamarack Allotment. Potential direct, indirect, and cumulative impacts associated with grazing would be eliminated. Potential cattle trampling at water sources would be eliminated. Riparian shrub recruitment may improve in response to the cessation of grazing in the allotment. Water sources potentially used by spotted frogs would be

retained should elimination of grazing occurs, so there would be no loss of suitable breeding habitat under this alternative. Because there would be no direct or indirect impacts on this species or its habitat resulting from the elimination of cattle grazing in the allotment, there would also be no cumulative impacts on this species and its habitat.

Determination of Effects and Rationale

This alternative would have no impact on the Columbia spotted frog. There would be no direct, indirect, and cumulative impacts because cattle grazing would be eliminated in the analysis area.

Alternative 2

Direct and Indirect Effects

Under this alternative, the current management in the allotment would continue. Cattle grazing within the Tamarack Allotment would directly and indirectly affect this species and its habitat. Livestock would not trample or otherwise disturb potential oviposition sites and egg masses in ponds and slow-moving streams within the allotment because livestock would enter the allotment after eggs have hatched (Bull and Hayes 2000). Bull and Hayes (2000) found no scientifically significant difference in the abundance of recently metamorphosed Columbia spotted frogs between grazed and ungrazed ponds in eastern Oregon. A similar study found no difference in egg mass counts, larval survival, or size at metamorphosis following exclusion of cattle from ponds in northeast Oregon (Adams et al. 2009).

It is unlikely that adult spotted frogs would be directly impacted during the grazing season due to their mobility. They would be able to avoid livestock trampling at ponds or other areas where they are encountered. Therefore, the potential for effects to egg masses, larvae and adults is relatively small, would be limited to an occasional individual, and would not impact population levels in the allotment.

A reduction of riparian vegetation (grasses and shrubs) through grazing may increase the susceptibility of spotted frogs to predation by reducing hiding cover. It is unlikely that reduced height of grasses in the allotment would adversely impact cover habitat for spotted frogs because PACFISH/IIT stubble height monitoring has consistently met standards in the Tamarack Allotment. This monitoring indicates that although vegetation (height) is reduced during the grazing period, residual cover is present in the allotment after livestock are removed. Condition and trend monitoring at Designated Monitoring Areas also indicates that upland vegetation communities are in a static or upward trend, and that conditions are consistent with Forest Plan goals. By meeting standards, this monitoring indicates that grazing is not adversely affecting the structure or composition of upland and riparian grassland vegetation and that cover is present post-grazing for spotted frogs.

Grazing is not expected to appreciably affect the biomass of insects (potential prey) or insect diversity within the allotment. Rambo and Faeth (1999) found no scientifically significant difference in insect biomass or diversity between grazed and ungrazed segments of streams and ponds. Because insect diversity and abundance is not expected to change in response to grazing, there would be no change in potential forage for the spotted frog.

Livestock use of water sources has the potential to impact water quality through the introduction of chemical contaminants (nitrates, nitrites, phosphates, ammonia) that have been found to have negative impacts on other amphibians (Knutson et al. 2004, Jofre and Karasov 1998). The level of impact would be related to the number of livestock and the amount of time livestock spend in and around the water source. In northeast Oregon, Adams and others (2009) found nitrate, phosphorous, and ammonia levels in grazed ponds to be very low (at or near detection limits).

They also found no significant differences between control and treatment (partial or full exclosure) ponds for pH, conductance, or acid neutralizing capacity (Adams et al. 2009). This research occurred in allotments with similar stocking (61-77 acres per cow-calf pair versus 93 acres per cow-calf pair for Tamarack) and season of use as the Tamarack Allotment. Due to the intensity of grazing (number of livestock relative to acres grazed) in the allotment and the availability of water (quantity and distribution of stock ponds and streams) in the area, it is not expected that grazing under these alternatives would result in levels of contaminants that would reduce habitat suitability or the reproductive success of this species.

Cumulative Effects

See Cumulative Effects Section below, under Alternative 3.

Alternative 3

Direct and Indirect Effects

This alternative would have virtually the same impacts as those described under Alternative 2. Construction of fence would eliminate cattle use of perennial streams that may be used by this species for breeding and summer foraging. Potential impacts to spotted frogs resulting from grazing in these areas would also be greatly reduced or eliminated. This alternative would also develop approximately 9 springs as upland water sources. Development would include installation of perforated pipe to direct a portion of the spring flow to a trough adjacent to the spring site; spring sites would not be de-watered. Spring sources would be protected using barbed wire fencing. These activities would reduce potential impacts associated with congregation of cattle at these sites. Protection of the spring sources would allow for the establishment and recovery of herbaceous vegetation and shrubs at the sites. While initial installation of piping (generally done by hand) would have a slight potential to impact this species, there would be a long term improvement in habitat quality at the sites for this species.

Cumulative Effects (Alternatives 2 and 3)

Past activities, actions, and events that affected Columbia spotted frog and its habitat include timber harvest, cattle grazing, pond construction, and other water developments. Timber harvest activities within the allotment resulted in disturbance to riparian habitats, a reduction in stream shading, and reduced habitat quality. Recovery from this activity is still occurring in the allotment. Past cattle grazing affected potential habitat by altering the structure and composition of riparian communities and reducing the quality of these habitats. Stocking densities in the early 1900's were much higher than current grazing. Historical grazing likely resulted in trampling at ponds and streams used for breeding. Much higher levels of contaminants likely entered ponds and streams within the allotment under past grazing management as a consequence of higher stocking densities. Grazed habitats are continuing to recover from past overgrazing. Past cattle grazing management also created potential breeding habitat through the creation of water sources (ponds) where they previously did not exist. Rock pit ponds were also created by road construction associated with timber harvest; some of these ponds that have become vegetated would provide breeding and summer foraging habitat for the spotted frog. Spring developments within the allotment to provide upland water sources for cattle to improve cattle distribution and move them out of riparian habitats likely had variable impacts. In some cases, springs were developed without regard to their existing value to wildlife; spring sites were likely de-watered to provide water for livestock. These activities, actions, and events have combined to create the existing condition of spotted frog habitat and populations in the allotment.

Ongoing and reasonably foreseeable future activities with a potential to impact the Columbia spotted frog and habitat for this species in addition to the proposed cattle grazing include culvert replacement (Wall Creek at 2402 Road), vegetation management (commercial thinning), and maintenance of water developments. Culvert replacement on Wall Creek has the potential to impact a small number of

individuals over a short period of time. Maintenance of water developments (ponds) has the potential to impact tadpoles in the short term, and spotted frog habitat in the long term. An excavator or backhoe is used to remove accumulated sediment from ponds. This activity could result in mortality of tadpoles. However, pond cleaning also maintains these man-made structures in a condition that is usable by spotted frogs; if ponds were not periodically cleaned, they would eventually fill with sediment and would no longer provide breeding habitat for the spotted frog.

When the expected effects of Alternatives 2 and 3 are combined with the residual and expected effects of past, present, and future actions, activities, and events in the analysis area, there would be no cumulative reduction in suitable habitat for the spotted frog. Grazing under these alternatives, when combined with other ongoing and future activities, actions, and events within the allotment, would not incrementally increase impacts on this species beyond what is already occurring. Due to the unlikely nature of potential direct impacts (trampling at water sources) and the low intensity of expected impacts (due to stocking levels and monitoring data), there would be no adverse cumulative impacts to populations or the distribution of the Columbia spotted frog at the scale of the Tamarack Allotment.

Determination of Effects and Rationale (Alternatives 2 and 3)

Alternatives 2 and 3 may impact individual Columbia spotted frogs or habitat, but would not contribute to a trend towards federal listing or cause a loss of viability to the population or species. This determination is based on the following:

- The Columbia spotted frog is present in the allotment. Foraging, breeding, and overwintering habitat is present.
- Egg masses and breeding activity would not be impacted because livestock would enter the allotment after breeding has occurred and after eggs have hatched.
- There is a potential that tadpoles in ponds, wet areas adjacent to streams, and slow- moving streams could be injured or killed by cattle trampling but this is not expected to result in population level impacts at the scale of individual ponds or the allotment (Bull and Hayes 2000, Bull et al. 2001, and Adams et al. 2009).
- Due to the intensity of grazing (number of livestock relative to acres grazed) and the availability of water (quantity and distribution of stock ponds and streams) in the area, it is not expected that grazing under these alternatives would result in levels of contaminants that would reduce the suitability of breeding ponds or reduce larval survival (Adams et al. 2009).
- Stubble height standards for riparian areas have been consistently met, based on monitoring results. This indicates that grazing is not adversely affecting the structure or composition of riparian vegetation and that cover is present for spotted frogs after cattle are removed from the allotment.
- There would be no cumulative reduction in suitable habitat or measurable impacts to populations through continued cattle grazing within this allotment under these alternatives.

White-headed and Lewis' Woodpecker (Sensitive)

Affected Environment

These species will be assessed together because they are associated with similar habitats. The white-headed woodpecker utilizes mature, single-stratum ponderosa pine-dominated habitats for nesting and foraging (NatureServe 2016). The Lewis' woodpecker is typically associated with open ponderosa pine woodland habitat near water.

Both of these species are present on the Umatilla National Forest, and are assumed to be present in the allotment area due to the presence of suitable habitat.

Environmental Consequences

Alternative 1

Direct, Indirect, and Cumulative Effects

Cessation of grazing in the Tamarack allotment would eliminate potential impacts on white- headed and Lewis' woodpecker habitat (snags). Existing fences would be removed; there would be no reason to maintain fence right of ways or remove hazard trees. Because there would be no direct or indirect impacts on these species or their habitat resulting from the elimination of cattle grazing in the allotment, there would also be no cumulative impacts on these species or their habitat under this alternative.

Determination of Effects and Rationale

This alternative would have no impact on the white-headed and Lewis' woodpecker because potential impacts would be eliminated through the cessation of grazing in the allotment.

Alternatives 2 and 3

Direct and Indirect Effects

Grazing would not directly impact the white-headed or Lewis' woodpecker. Cattle grazing would not affect the structure or composition of existing source habitat in the allotment. Overstory vegetation (ponderosa pine and mixed pine and fir stands in older structural stages) would not be affected by grazing. Fence maintenance activities (right of way clearing, hazard tree felling, etc.) have the potential to affect a very small number of snags potentially used by these species for nesting and roosting. This would also be the case for new fences constructed under Alternative 3. It is expected that the potential impact associated with this activity would not be measureable at the allotment or larger scale due to the relatively small number of snags that may be impacted and the linear nature of the affected area.

Cumulative Effects

Potential felling of snags within the allotment to protect range improvements would add to past reductions in large diameter snags resulting from timber harvest, danger tree felling, and other activities, actions, and events. Because this impact is not expected to be measureable at the scale of the allotment, the cumulative impact on snags is expected to be negligible.

Determination of Effects and Rationale (Alternatives 2 and 3)

Alternatives 2 and 3 may impact white-headed and Lewis' woodpecker habitat, but would not contribute to a trend towards federal listing or cause a loss of viability to the population or species. The rationale for this determination is as follows:

- These species have been observed on the District; they are assumed to be present in the allotment.
- Grazing would not directly impact these species, if it is present in the allotment.
- Grazing would also not impact the structure or composition of potential habitat and currently suitable white-headed and Lewis' woodpecker habitat in the allotment.
- A very small number of snags (potential nesting and roosting structures) may be felled to protect range improvements in the allotment. This impact would be negligible.

The cumulative impact associated with felling of a very small number of snags to protect range improvements would be negligible due to the intensity and linear nature of the proposed activity. The

cumulative impact to the availability of snags would be negligible at the allotment scale when combined with other activities, events, and actions.

Fringed Myotis (Sensitive)

Affected Environment

Fringed myotis are found throughout much of western North America from sea level to 2,850 meters in elevation. Distribution is patchy, but appears to be most common in drier woodlands (oak, pinyon-juniper, ponderosa pine), but is also found in a wide variety of habitats including desert scrub, mesic coniferous forest, grassland, and sage-grass steppe (Western Bat Working Group 2005b). The database of record (NRIS Wildlife) contains no observations/records of this species in the Tamarack Allotment; however, this species was noted in multiple years at a site approximately 8 miles northeast of the allotment. Potential roosting and foraging habitat is present in the allotment area.

Environmental Consequences

Alternative 1

Direct, Indirect, and Cumulative Effects

Cessation of grazing in the Tamarack allotment would eliminate potential impacts on fringed myotis habitat (snags). Existing fences would be removed; there would be no reason to maintain fence right of ways or remove hazard trees. Water sources potentially used for night foraging would be retained should elimination of grazing occurs, so there would be no loss of suitable foraging habitat under this alternative. Because there would be no direct or indirect impacts on this species or its habitat resulting from the elimination of cattle grazing in the allotment, there would also be no cumulative impacts on this species or its habitat under this alternative.

Determination of Effects and Rationale

This alternative would have no impact on the fringed myotis because potential impacts would be eliminated through the cessation of grazing in the allotment.

Alternatives 2 and 3

Direct and Indirect Effects

Grazing would not directly impact the fringed myotis. Overstory vegetation (ponderosa pine and mixed pine and fir stands in older structural stages) would not be affected by grazing. Fence maintenance activities (right of way clearing, hazard tree felling, etc.) have the potential to affect a very small number of snags potentially used by this species for day roosting. This would also be the case for new hard (barbed wire) fences constructed under Alternative 3. It is expected that the potential impact associated with this activity would not be measureable at the allotment or larger scale due to the relatively small number of snags that may be impacted and the linear nature of the affected area.

Cumulative Effects

Potential felling of snags within the allotment to protect range improvements would add to past reductions in large diameter snags within the allotment resulting from timber harvest, danger tree felling, and other activities, actions, and events. Due to the fact that this impact is not expected to be measureable at the scale of the allotment, the cumulative impact on snags is expected to be negligible.

Determination and Rationale (Alternatives 2 and 3)

Alternatives 2 and 3 may impact fringed myotis habitat, but would not contribute to a trend towards federal listing or cause a loss of viability to the population or species. The rationale for this determination is as follows:

- This species is present on the District, and is assumed to be present in the allotment.
- Grazing would not directly impact this species if it is present in the allotment.
- Grazing would also not impact the structure or composition of potential habitat in the allotment.
- A very small number of snags (potential day roosting structures for this species) may be felled to protect range improvements in the allotment. This impact is expected to be negligible.

The cumulative impact associated with felling of a very small number of snags to protect range improvements would be negligible due to the intensity and linear nature of the proposed activity. The cumulative impact to the availability of snags at the allotment scale, when combined with other activities, events, and actions that have affected snags, would be negligible.

Johnson's Hairstreak Butterfly (Sensitive)

Affected Environment

Larvae of this butterfly are associated with coniferous forests that contain mistletoes of the genus *Arceuthobium* (dwarf mistletoes) (NatureServe 2016). Adults feed on a variety of nectar flowers. This species is considered to be an obligate old growth butterfly; due to their association with and tendency to reside in the forest canopy, this species is not often encountered. This species has been observed on the Umatilla National Forest. Threats to this species include habitat destruction (timber harvest, sanitation harvest, fire, etc.) and application of pesticides (including BTK bacterium) and herbicides.

Surveys for this species occurred in 2012. Genetic analysis indicated that none of the samples collected during the 2012 field season were Johnson's hairstreak butterflies. It is currently unknown whether this species is present on the District. Because suitable habitat is present on the District and in the vicinity of the Tamarack Allotment, it is assumed to be present for the purposes of this analysis.

Environmental Consequences

Alternative 1

Direct, Indirect, and Cumulative Effects

Under this alternative, grazing would be eliminated in the Tamarack Allotment. All potential direct, indirect, and cumulative impacts associated with this activity would cease through elimination of grazing.

Determination of Effects and Rationale

This alternative would have no impact on the Johnson's hairstreak butterfly and potential habitat in the allotment because potential impacts associated with cattle grazing would cease.

Alternatives 2 and 3

Direct and Indirect Effects

Cattle grazing would not affect the availability of the host plant species (dwarf mistletoe) for this species. Cattle do not eat or otherwise impact the larval host plant. Grazing has not been identified as a potential threat to this species. Because adults of this species feed on a variety of nectar flowers, there is a potential that cattle may utilize some of the same resources as the Johnson's hairstreak

butterfly. Due to the fact that monitoring indicates utilization of herbaceous vegetation in riparian and upland areas has consistently met Forest Plan standards, it is unlikely that forage resources for this species would be adversely impacted by cattle grazing.

Cumulative Effects

Past activities, actions, and events that likely affected Johnson's hairstreak habitat include timber harvest, hazard tree removal, and cattle grazing. Timber harvest and hazard tree removal activities within the allotment resulted in reductions in the availability of the larval host plant. Mistletoe was specifically targeted in some timber sale for removal, and is often removed as a hazard along roads. Past cattle grazing affected potential habitat by altering the composition of understory vegetation and reducing the quantity of foraging habitat. Stocking densities in the early 1900's were much higher than current grazing. Grazed habitats are continuing to recover from past overgrazing. These activities, actions, and events have combined to create the existing condition of potential Johnson's hairstreak habitat in the allotment.

Ongoing and reasonably foreseeable future activities within the allotment with the potential to affect this species or its habitat include timber harvest and prescribed burning (Kahler), danger tree felling, and cattle grazing. All of these activities would have the same or similar impacts as those described above. Vegetative harvest in the Kahler Dry Forest Restoration Project would target mistletoe infected trees, reducing potential forage for the Johnson's hairstreak butterfly. Prescribed burning may have short term impacts on nectar plants; this potential impact is highly dependent on timing of burning. Most nectar producing plants are dormant (in the case of spring burning) or have completed their reproductive cycle (in the case of fall burning) when conditions are appropriate for prescribed burning. There are no other reasonably foreseeable future actions in the analysis area that would impact this species.

When the expected effects of these alternatives are combined with the residual and expected effects of past, present, and future actions, activities, and events in the analysis area, there would be no incremental reduction in potential foraging habitat for the Johnson's hairstreak. Based on monitoring data collected in the allotment (indicating consistent attainment of Forest Plan standards for utilization), impacts to nectaring habitat (forage) for the Johnson's hairstreak butterfly would be minor.

Determination of Effects and Rationale (Alternatives 2 and 3)

Alternatives 2 and 3 may impact Johnson's hairstreak habitat, but would not contribute to a trend towards federal listing or cause a loss of viability to the population or species. The rationale for this determination is as follows:

- It is currently unknown whether this species is present on the District; it is assumed present for the purposes of this analysis.
- Grazing would not directly impact this species if it is present in the allotment.
- Grazing would not impact larvae, the larval host plant, or the distribution of either in the allotment.
- Cattle grazing has the potential to affect plants used by nectaring adults. Based on monitoring data, it is unlikely that cattle would adversely impact forage for this species under these alternatives.
- There would be no cumulative reduction in foraging habitat for this species.

Intermountain Sulphur Butterfly (Sensitive)

Affected Environment

The intermountain sulphur inhabits open woodland from 3,400 to 5,000 feet in elevation, including meadows, roadsides, and open forest. . Habitat for this species includes sagebrush with scattered ponderosa pine, including both south- and east-facing slopes. The larvae of this subspecies feed on *Lathyrus* (sweat pea) species. Adults use a variety of plants for nectaring, although all known Oregon locations are situated east of the Forest, this species is suspected to occur on the Umatilla National Forest. Loss of habitat due to agricultural conversion and development are the primary threats to this species. Pesticide use, especially aerial applications, also poses serious threats to this species. There have been no known surveys for this species on the District. There have also been no known incidental observations of this species on the District. It is currently unknown whether this species is present on the District. Due to the fact that suitable habitat is present on the District and in the vicinity of the Tamarack Allotment, it is assumed to be present for the purposes of this analysis.

Environmental Consequences

Alternative 1

Direct, Indirect, and Cumulative Effects

Under this alternative, grazing would be eliminated in the Tamarack Allotment. All potential direct, indirect, and cumulative impacts associated with this activity would cease through elimination of grazing.

Determination of Effects and Rationale

This alternative would have no impact on the intermountain sulphur butterfly and potential habitat in the allotment due to the fact that potential impacts associated with cattle grazing would cease.

Alternatives 2 and 3

Direct and Indirect Effects

Research indicates that the diet of cattle is composed primarily of grasses (Holechek et al. 1982). Holechek and others (1982) found that 80 percent of cattle diets were composed of grasses in grassland settings. This study also found that forbs (herbaceous non-grass species) made up 14 percent of cattle diets in grassland settings. Because cattle may specifically target forbs during portions of the year and incidentally consume forbs while consuming preferred vegetation (grasses), cattle grazing may impact the availability of larval host plants, directly impact larvae, and impact the availability of flowering plants for adult butterflies, if present. Grasslands in the allotment (Stalling Butte and Little Tamarack pastures) are grazed early in the season when grasses are green and palatable; as a result, expected impacts to forbs (including host plants and nectaring flowers) would be minor. Grazing of intermountain sulphur larval host plants and nectaring plants by cattle would largely be incidental to selection of grasses while foraging. Monitoring indicates that utilization of herbaceous vegetation consistently meets Forest Plan standards (stubble height) for utilization. Based on this monitoring data, grazing under these alternatives is not expected to adversely impact the quality or quantity of the larval host plant, adult forage resources, or impact population levels in the allotment.

Cumulative Effects

Past activities, actions, and events that affected potential intermountain sulphur habitat include cattle grazing and prescribed fire. Past grazing occurred at much higher stocking levels than those currently occurring; overutilization likely resulted in greater utilization of forbs, including preferred food plants and larval host plants. The time that has passed since overgrazing has likely eliminated any residual

impacts associated with this activity. Prescribed fire also impacted vegetation within the allotment. These events generally reduced low-level vegetation immediately following the events, but stimulated grass, forb, and shrub growth in the years following burning. These events also have short-lived residual impacts on potential habitat, and are not likely impacting potential habitat in the allotment.

Ongoing and reasonably foreseeable future activities with a potential to impact potential intermountain sulphur habitat include cattle grazing, vegetative treatment, and prescribed fire (Kahler Dry Forest Restoration Project). Vegetative treatment and burning under the Kahler Project would have short term, temporary impacts on existing forage resources for this species. In the long term, commercial thinning, shrub-steppe enhancement, and burning would improve the quality of potential habitat by reducing competition with encroaching conifers and improving grassland and shrubland habitat conditions.

When the expected effects of these alternatives are combined with the residual and expected effects of past, present, and future actions, activities, and events in the analysis area, there would be no incremental reduction in potential habitat for the intermountain sulphur. Cattle may have slight impacts on larval host plants (very low stature) and nectaring plants potentially used by this species through inadvertent ingestion in grassland habitats. Based on monitoring data collected in the allotment, the cumulative impact on nectaring habitat (forage) or the larval host plant for the intermountain sulphur is expected to be minor.

Determination of Effects and Rationale

Alternatives 2 and 3 may impact potential intermountain sulphur habitat, but would not contribute to a trend towards federal listing or cause a loss of viability to the population or species. The rationale for this determination is as follows:

- It is currently unknown whether this species is present on the District; it is assumed present for the purposes of this analysis.
- Grazing would not directly impact adult intermountain sulphur butterflies. There is a small potential for the larval host plant and larval intermountain sulphur to be consumed by cattle when they occupy the allotment.
- Cattle grazing has the potential to affect nectar-producing plants used by adults.
- Based on monitoring data, it is unlikely that cattle would adversely impact nectaring plants or the availability or distribution of the larval host plant under these alternatives. Although preferred forage plants and larval host plants may be grazed to a small degree, habitat suitability would not be affected. The proposed alternatives are not expected to impact population levels in the allotment, if present.
- The larval host plant may be cumulatively impacted to a small degree in the short term. There would be no cumulative reduction in foraging habitat for this species.

Western Bumblebee (Sensitive)

Affected Environment

The western bumblebee was historically broadly distributed across the west coast of North America from Alaska to central California and east through Alberta and western South Dakota. Recent analysis of historic and current observations suggests that this species has experienced significant declines in abundance and distribution in recent years. Since 1998 the western bumblebee has declined most dramatically from western and central California, western Oregon, western Washington, and British Columbia. Although absent from much of its former range, the species is still found in isolated areas, primarily in the Rocky Mountains (Evans et al. 2012).

Bumble bees inhabit a wide variety of natural, agricultural, urban, and rural habitats, although species richness tends to peak in flower-rich meadows of forests and subalpine zones. Like other bumble bees, the western bumblebee has three basic habitat requirements: suitable nesting sites for the colonies, nectar and pollen from floral resources available throughout the duration of the colony period (spring, summer and fall), and suitable overwintering sites for the queens. Nests are primarily in underground cavities such as old squirrel or other animal nests and in open west- southwest slopes bordered by trees, although a few nests have been reported from above-ground locations. Bumble bees require plants that bloom and provide adequate nectar and pollen throughout the colony's life cycle. This species is a generalist forager and has been reported to visit a wide variety of flowering plants in Oregon and Washington. Very little is known about overwintering sites, other than they are underground. Primary threats include pathogens from commercial bumble bees and other sources, impacts from reduced genetic diversity, and habitat alterations including conifer encroachment (resulting from fire suppression), grazing, prescribed and natural fire, and logging.

This species has been documented on the Umatilla National Forest. Species-specific surveys have not been completed on the Forest. There have been no recorded observations of this species in the Tamarack Allotment. The nearest historic record is from over 30 miles east at the Dale-Ukiah wayside in 1974.

Environmental Consequences

Alternative 1

Direct, Indirect, and Cumulative Effects

Under this alternative, grazing would be eliminated in the Tamarack Allotment. All potential direct, indirect, and cumulative impacts associated with this activity would cease through elimination of grazing.

Determination of Effects and Rationale

This alternative would have no impact on the western bumblebee and potential habitat in the allotment due to the fact that potential impacts associated with cattle grazing would cease.

Alternatives 2 and 3

Direct and Indirect Effects

Research indicates that the diet of cattle is composed primarily of grasses (Holechek et al. 1982). Holechek and others (1982) found that 80 percent of cattle diets were composed of grasses in grassland settings. This study also found that forbs (herbaceous non-grass species) made up 14 percent of cattle diets in grassland settings. Because cattle may specifically target forbs during portions of the year and incidentally consume forbs while consuming preferred vegetation (grasses), cattle grazing may impact the availability of nectar-producing plants for this species. Grazing of nectaring plants by cattle would largely be incidental to selection of grasses while foraging. Monitoring indicates that utilization of herbaceous vegetation consistently meets Forest Plan standards (stubble height) for utilization. Condition and trend plots also indicate that range conditions are in a static to upward trend in the allotment. Based on this monitoring data, grazing under these alternatives is not expected to adversely impact the quality or quantity of western bumblebee habitat or nectar-producing plants that this species relies on.

Cumulative Effects

Past activities, actions, and events that affected potential western bumblebee habitat include cattle grazing and prescribed fire. Past grazing occurred at much higher stocking levels than those currently occurring; overutilization likely resulted in a reduction of forbs, including preferred food plants. The

time that has passed since overgrazing has likely eliminated any residual impacts associated with this activity. Prescribed fire also impacted vegetation within the allotment. These events generally reduced low-level vegetation immediately following the events, but stimulated grass, forb, and shrub growth in the years following burning. These events also have short-lived residual impacts on potential habitat, and are not likely impacting potential habitat in the allotment.

Ongoing and reasonably foreseeable future activities with a potential to impact potential western bumblebee habitat include cattle grazing, vegetative treatment, and prescribed fire (Kahler Dry Forest Restoration Project). Vegetative treatment and burning under the Kahler Project would have short term, temporary impacts on existing forage resources for this species. In the long term, commercial thinning, shrub-steppe enhancement, and burning would improve the quality of potential habitat by reducing competition with encroaching conifers and improving grassland and shrubland habitat conditions.

When the expected effects of these alternatives are combined with the residual and expected effects of past, present, and future actions, activities, and events in the analysis area, there would be no incremental reduction in potential habitat for the western bumblebee. Cattle may have slight impacts on nectaring plants potentially used by this species through inadvertent ingestion in grassland habitats. Based on monitoring data collected in the allotment, the cumulative impact on nectaring habitat (forage) is expected to be minor.

Determination of Effects and Rationale

Alternatives 2 and 3 may impact potential western bumblebee habitat, but would not contribute to a trend towards federal listing or cause a loss of viability to the population or species. The rationale for this determination is as follows:

- It is currently unknown whether this species is present on the District; it is assumed present for the purposes of this analysis.
- Grazing would not directly impact western bumblebees.
- Cattle grazing has the potential to affect nectar-producing plants used by adults.
- Based on monitoring data, it is unlikely that cattle would adversely impact nectaring plants under these alternatives. Although preferred forage plants may be grazed to a small degree, habitat suitability would not be affected. The proposed alternatives are not expected to impact population levels in the allotment.

Summary of Impacts to Proposed, Endangered, Threatened, and Candidate Wildlife Species and R6 Sensitive Wildlife Species and Habitat

Biological Evaluation

Impacts were not evaluated for the painted turtle, upland sandpiper, peregrine falcon, Townsend's big-eared bat, Canada lynx, fir pinwheel, and Yuma Skipper because they are not present in the analysis area, have no suitable or potential habitat within the analysis area, or both. For this reason, the proposed project would have no impact on these Region 6 Sensitive Species.

The species listed below are those Federally ESA listed (or proposed for listing) and Region 6 Sensitive Species that were analyzed for the Tamarack Allotment Project. This table summarizes the determinations made in this section.

Table 3-4: Summary of Determinations for Proposed, Endangered, Threatened, and Candidate Wildlife Species and R6 Sensitive Wildlife Species

Species	Designation	Alternative 1 Determination	Alternative 2 Determination	Alternative 3 Determination
Gray wolf (*Canis lupus*)	Endangered	NE	NE	NE
North American wolverine (*Gulo gulo)*	Proposed Threatened	NE	NE	NE
Columbia spotted frog (*Rana luteiventris)*	Sensitive	NI	MIIH	MIIH
Rocky Mountain tailed frog (*Ascaphus montanus)*	Sensitive	NI	MIIH	MIIH
Bald eagle (*Haliaeetus leucocephalus)*	Sensitive	NI	NI	NI
White-headed woodpecker (*Picoides albolarvatus)*	Sensitive	NI	MIIH	MIIH
Lewis' woodpecker (*Melanerpes lewis)*	Sensitive	NI	MIIH	MIIH
Johnson's hairstreak (*Callophrys johnsoni)*	Sensitive	NI	MIIH	MIIH
Intermountain sulphur Colias (*christina pseudochristina)*	Sensitive	NI	MIIH	MIIH
Fringed myotis *(Myotis thysanodes)*	Sensitive	NI	MIIH	MIIH
Western bumblebee *(Bombus occidentalis)*	Sensitive	NI	MIIH	MIIH

NE - No effect on a proposed or listed species or critical habitat; **NLAA** - May affect, but not likely to adversely affect a listed species or critical habitat; **LAA** - May affect and likely to adversely affect a listed species or critical habitat; **NI -** No Impact to R6 sensitive species individuals, populations, or their habitat; **MIIH -** May Impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species; **WI -** Will impact individuals or habitat with a consequence that the action will contribute to a trend towards federal listing or cause a loss of viability to the population or species.

Birds of Conservation Concern

Affected Environment

The appropriate state Bird Conservation Plan and USFWS Birds of Conservation Concern species list for the project area was reviewed. Those species and habitats that are within the project area are incorporated and effects disclosed in this analysis. Table 3-5 lists Birds of Conservation Concern (BCC) that are known or likely to be present in the planning area and could be affected by the Proposed Action.

Table 3-5: USFWS Birds of Conservation Concern (BCC) for Bird Conservation Region 10 - Northern Rockies that are known or likely to be present in the Planning Area and could be affected by the Proposed Action.

Bird Species	Preferred Habitat
Flammulated Owl	Associated with ponderosa pine forests and mixed conifer stands with a mean 67% canopy closure, open understory with dense patches of saplings or shrubs.
Olive-sided Flycatcher	Open conifer forests (< 40 % canopy cover) and edge habitats where standing snags and scattered tall trees remain after a disturbance.

Bird Species	Preferred Habitat
Calliope Hummingbird	Predominantly a montane species found in open shrub sapling seral stages (8-15 years) at higher elevations and riparian areas.
Cassin's Finch	Open, mature coniferous forests of lodgepole and ponderosa pine, aspen, alpine fir, grand fir and juniper steppe woodlands
Williamson's Sapsucker	E. Cascades, mid to high elevation, mature open and mixed coniferous - deciduous forests. Snags are a critical component.
Lewis's Woodpecker	Ponderosa Pine, Cottonwood riparian or Oak habitats with an open canopy, brushy understory, dead and down material, available perches and abundant insects.
White-headed Woodpecker	Mixed conifer forests (< 40 % canopy cover) dominated by old growth Ponderosa Pine and open habitats where standing snags and scattered tall trees remain

Environmental Consequences

Effects to Lewis' woodpecker and white-headed woodpecker were analyzed earlier in this report and will not be displayed here.

Table 3-6: Effects of Alternatives 1, 2, and 3 on USFWS Birds of Conservation Concern (BCC) for Bird Conservation Region 10 - Northern Rockies.

Species	General Habitat Requirements	Alternative 1 Impacts to Habitat	Alternatives 2 and 3 Impacts to Habitat
Olive-sided flycatcher *(Contopus cooperi)*	Associated with natural or man-made openings with tall trees or snags available for perching and singing.	No Impact	No impact to nesting trees. No impact to opening/edge forage habitat.
Calliope hummingbird *(Stellula calliope)*	Predominantly a montane species found in open shrub sapling seral stages (8-15 years) at higher elevations and riparian areas.	No Impact	No impact to nesting trees. Limited impacts to nectar sources.
Williamson's sapsucker *(Sphyrapicus thyroideus)*	E. Cascades, mid to high elevation, mature open and mixed coniferous - deciduous forests. Snags are a critical component.	No Impact	Negligible impact to nest snags. No impact to sap bearing trees.
Cassin's finch *(Carpodacus cassinii)*	Open, mature coniferous forests of lodgepole and ponderosa pine, aspen, alpine fir, grand fir and juniper steppe woodlands	No Impact	No impact to nesting trees. No impacts to stand density or forage.
Flammulated owl *(Otis flammeolus)*	Associated with ponderosa pine forests and mixed conifer stands with a mean 67% canopy closure, open understory with dense patches of saplings or shrubs.	No Impact	Negligible impact to nesting/roosting snags. No impact to other features.

3.3 HYDROLOGY

This section incorporates by references Report the hydrology specialist located in the project file. This report contains the data, methodologies, analysis, maps, reference, and technical documentation that the specialist relied on to reach the conclusions discussed in this section.

Scale of the Analysis

The hydrologic effects of Proposed Action will be analyzed for National Forest System (NFS) lands by subwatersheds, or Hydrologic Unit Code 6 (HUC6). This geographic extent encompasses the area

that reasonably could be affected by the Proposed Action associated with the Tamarack Grazing Allotment Management Plan. Table 3-7 displays the subwatersheds that encompass the Tamarack Grazing Allotment Management Area.

Table 3-7: Watersheds and subwatersheds within the project area.

Watershed	Subwatershed (SWS) HUC 6	Hydrologic Unit Code (HUC)	Total SWS Acres	Acres in Allotment
Kahler Creek-John Day River	Bologna Canyon Creek	170702040101	16,143	3,063
	Haystack Creek-John Day River	170702040105	28,999	1,789
	Upper Kahler Creek	170702040103	19,608	5,540
Wall Creek	Upper Big Wall Creek	170702020805	15,916	9,060

Resource Indicators and Issues

The hydrology analysis evaluates the Proposed Action and alternatives for consistency with the Forest Plan, laws, regulations, and policies and will address key issues. The resource indicators used in this analysis include water quality measured by temperature, dissolved oxygen, pH, and sediment. The change of riparian vegetation is measured by end-of-season stubble height, percent bank alteration, herbaceous utilization and woody shrub utilization.

Affected Environment

Water Quality

The State of Oregon is responsible for implementing the Clean Water Act (CWA), which requires that water quality standards be developed to protect beneficial uses and a list be developed of water quality impaired streams (303d list). When water quality standards are not met the CWA further requires development of Total Maximum Daily Loads (TMDL) for the pollutants (calculated pollutant amounts or surrogate criteria that a water body can receive and still meet Oregon water quality standards). See the hydrology report (project file) for further information on TMDL's.

The Oregon Department of Environmental Quality (ODEQ) identifies the following beneficial uses for the John Day River and all tributaries: public water supply, private domestic water supply industrial water supply, irrigation, livestock watering, fish and aquatic life, wildlife, and hunting, fishing, boating, water contact recreation, aesthetic quality, hydropower, and commercial navigation and transportation. ODEQ has developed water quality standards to protect beneficial uses. Pollutants that may affect water quality and beneficial uses are addressed below. See hydrology report (project file) for water quality support status for streams listed on Oregon's 2010 303(d) list.

Section 303(d) of the 1972 Federal Clean Water Act requires that water bodies that violating water quality standards, thereby failing to fully protect beneficial uses be identified. Total Maximum Daily Loads (TMDLs) must then be completed for the 303(d) listed waterbodies. TMDLs identify loading capacities that are set to limit pollutant levels such that water quality standards are met.

Temperature

In order to protect all designated beneficial uses, water quality standards are developed to protect the most sensitive beneficial use. The Oregon temperature water quality standard is based on protection of sensitive fish though various life phases.

Dissolved Oxygen (DO) and pH

Dissolved oxygen and pH can be affected by oxygen consumption through chemical and biological processes. These processes include decomposition of organic material in the water column and in streambed sediment, photosynthesis and inputs of oxygen-depleted water or oxygen demand from

point sources. There are no known point sources in the planning area. Algae photosynthesis can be augmented from reduced riparian shade, changes in nutrient delivery and changes in the flow regime or loss of instream structure resulting in streambed scour.

Sediment

Livestock grazing can increase fine sediment levels in streams for transport. This can occur where livestock grazing results in compacted soils and bare areas from overgrazing. Livestock grazing can also decrease bank stability through trampling or loss of root strength resulting in fine sediment routed to streams. Bank weakening, by vegetation disturbance and associated loss of soil/root strength, can result in wide and shallow channels. During the critical dry season, the condition of intermittent and ephemeral streams can indirectly influence stream temperature in perennial streams. Vegetation disturbance and channel modifications along non-perennial streams typically increase the delivery of fine sediment. This in turn, increases sediment in perennial streams, generally leading to shallowing and widening and corollary increases in solar heating (ODEQ 2010).

Table 3-8: Water Quality Limited streams in the planning area.

Stream	River Mile	Pollutant	Season of Use	Beneficial Uses	Criteria	Status
Big Wall Creek	0–21.3	Temperature	Year Round	Salmon and trout rearing and migration	Salmon and trout rearing and migration: 18.0oC 7-day-average maximum	TMDL approved
Big Wall Creek	0–17	Dissolved Oxygen	Jan 1–May 15		Spawning: Not less than 11.0 mg/L or 95% of saturation	TMDL Needed
Big Wall Creek	0–21.3	Dissolved Oxygen	Year Round		Cold water: Not less than 8.0 mg/L or 90% of saturation	TMDL Needed
Big Wall Creek	0–21.3	pH	Fall, Winter, Spring		pH of 6.5–9.0	TMDL Needed
Big Wall Creek	0–21.3	Sedimentation	Undefined	Salmonid fish spawning; resident fish and aquatic life; salmonid fish rearing	The formation of appreciable bottom or sludge deposits or any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry may not be allowed	TMDL Needed
Kahler Creek	0–12.2	Dissolved Oxygen	Year Round		Cool water: Not less than 6.5 mg/L	TMDL Needed
Kahler Creek	10.6–13.8	Dissolved Oxygen	Jan 1–May 15		Spawning: Not less than 11.0 mg/L or 95% of saturation	TMDL Needed
Tamarack Creek	0–1.3	Dissolved Oxygen	Year Round		Spawning: Not less than 11.0 mg/L or 95% of saturation	TMDL Needed

Riparian Areas

Riparian vegetation performs a number of vital functions that affect the quality of fish habitat. Vegetation increases allow roots to stabilize streambanks and stems and foliage to slow water

velocities, trap fine sediments, and provide the following: cover for fish, shade, and additional terrestrial invertebrate input important to fish diet during the summer months (see fisheries specialist report in the file). These areas are vital to maintaining water quality and a productive aquatic ecosystem.

Existing Condition

Water Quality

EPA approved the John Day River Basin TMDL[1] on December 17, 2010 and the Forest Service fulfilled the legal requirement to provide Oregon Department of Environmental Quality an implementation plan showing how pollutants would be reduced over the long term to meet load requirements outlined in the TMDL. The John Day River Basin Water Quality Restoration Plan serves as the Forest Service TMDL Implementation Plan for the John Day River Basin TMDL pursuant OAR chapter 340, division 42 (FS, 2014).

The 2010 TMDL covers the 2004/2006 list of 303(d) water quality impaired streams as it was the most current edition at the time the TMDL was written. DEQ postponed the sedimentation TMDL because the agency was trying to develop reliable quantitative methods and benchmarks for this pollutant. The only water quality limited stream within the analysis area addressed in the 2010 TMDL is the year-round temperature exceedance of Big Wall Creek.

Every two years, DEQ is required to assess water quality and report to the EPA on the condition of Oregon's waters. The Oregon Department of Environmental Quality (ODEQ) prepared and submitted Oregon's 2010 303(d) list for EPA to review, and EPA partially approved and partially disapproved the submitted list in 2012. EPA also added several new listings in the planning area for dissolved oxygen (DO) and pH Oregon's 2010 303(d) list was finalized in December 2012. ODEQ submitted Oregon's 2012 Integrated Report and 303(d) list to EPA in November 2014. The Oregon 2012 303(d) list with EPA's modifications received partial EPA approval in December 2016 and is currently the approved list for Clean Water Act purposes: http://www.oregon.gov/deq/wq/Pages/WQ-Assessment.aspx

Water quality impaired streams in the planning area are identified in Table 3-8. While the TMDL only addresses the Big Wall temperature listing, the FS WQRP was written to address both the listings covered under the 2010 TMDL and subsequent added listings to Oregon's 303(d)[2]. The FS WQRP is consistent with and builds upon existing FS management plans and strategies. The WQRP expects that current policies, regulations and programs including the National Best Management Program (BMP) and PACFISH/INFISH Biological Opinion (PIBO) Effectiveness Monitoring Program will assure compliance with the CWA.

Temperature

There are two FS temperature monitoring sites with long-term records in the area, Big Wall Creek and Kahler Creek below Tamarack Creek as well as some data prior to 2007 for the West Fork of

[1] Pending judgement on litigation and EPA's final action on Oregon's 2012 303(d) list have implications to water quality status on NFS lands (Northwest Environmental Advocates v. U.S. Environmental Protection Agency). This report is based on the current status of 303(d) listings, TMDL, WQRP, FS programs, plans and actions intended to protect water and restore water quality. It is anticipated that under this ruling TMDLs, WQRPs and planning documents will be updated to be compliant with the direction.

[2] The sedimentation and pH listings are not addressed in either document. While sediment is listed as a pollutant by Oregon there is currently no numeric standard or administration rule specific to sediment. DEQ postponed the sedimentation TMDL because the agency was trying to develop reliable quantitative methods and benchmarks for this pollutant.

Bologna Creek. Big Wall Creek is the only stream designated as water quality limited by Oregon Department of Environmental Quality (ODEQ) for exceeding the "salmon and trout rearing and migration standard" of 18ºC (64.4ºF) based on a seven day average of maximum daily temperatures within the Tamarack Allotment (Table 3-9). Big Wall Creek flows adjacent to the northeast corner of the allotment and the temperature listing extends above and below the allotment. The entire mainstem length of Big Wall Creek within the Tamarack Allotment is fenced. Recorded stream temperatures in Kahler Creek below Tamarack Creek are not currently exceeding temperature standards (Table 3-9). Stream temperature monitoring will continue on the long-term monitoring site on Big Wall Creek.

Table 3-9: Long-term Stream Temperature Data (7-Day Maximum Daily Average Temperature in degrees Fahrenheit)

Year	Big Wall Creek at Forest Boundary (ºF)	Kahler Creek below Tamarack Creek (ºF)	West Fork of Bologna Creek (ºF)
1993	No Data	59	
1994	80	65	56
1995	77	64	
1996	68	66	56
1997	68	64	
1998	77	64	
1999	76	63	
2000	74	66	
2001	75	65	
2002	74	64	
2003	71	63	66
2004	77	61	55
2005	74	61	53
2006	78	61	55
2007	74	60	
2008	72	58	
2009	74	61	
2010	74	No Data	
2011	71	57	
2012	75	57	
2013	77	59	
2014	75	62	
2015	72	58	

Dissolved Oxygen (DO) and pH

The TMDL determined that the DO issues on the streams it addressed was most likely due to the growth and die-off of algae and related bacteria producing a distinct daily cycling of DO concentrations, with the highest concentrations occurring in the afternoon when oxygen release from photosynthesis is at a maximum. In the early morning, bacterial die-off and decomposition depletes the water column of DO. The analysis in the TMDL demonstrated DO standards on the streams analyzed would be obtained with attainment of temperature standards (ODEQ, 2010). Big Wall Creek, Kahler and Tamarack Creek were determined by EPA to exceed water quality standards for DO (Table 3-8).

The 2012 Environmental Protection Agency (EPA) submittals to the 303(d) list also included a pH exceedance for Big Wall Creek for the fall, winter and spring season. It is not listed for the summer months when cattle usage and temperatures are highest. This listing extends above and below the planning area. This parameter was not addressed in the 2010 Total Maximum Daily Load (TMDL). The DO and pH listings are based on grab sample data from 1998 to 2002. Under PACFISH, management actions to improve riparian conditions have improved substantially over the last twenty years. Kahler Creek below Tamarack Creek appears to indicate an improvement in stream temperatures over the last decade which suggests that DO levels are also improving, however, there is no more recent sampling of DO and pH in the analysis area.

Sediment

Streams across most of the subbasin are naturally flashy with high precipitation intensity accelerating runoff, increasing channel incision, erosion and sedimentation. Flashy discharge regimes result in stream systems that generally do not store excess sediment. The discharge regime and legacy management effects have resulted in incised and widened stream systems within the Wall Creek watershed.

The FS with funding from EPA, did a watershed-wide sediment analysis with an inventory and assessment of the road system using the "Geomorphic Roads Inventory and Analysis Package (GRAIP) (FS, 2010). This watershed-wide assessment was motivated by the Forest Service's commitment to address 303(d) listed streams and support the development of the John Day Basin TMDL. The resulting document concluded that the estimated sediment yields are relatively low within the Wall Creek watershed. Sediment produced in the watershed is generally fine-grained and readily mobile, with transport occurring during short periods of precipitation and/or snowmelt. The document states that other sources include historic grazing and logging, but these are largely legacy effects with sediment either already mobilized in the channel network or exported out of the watershed. Current practices (grazing, logging, recreation) produce small amounts of sediment, but Best Management Practices (BMPs) control delivery to channels so effects are minor and localized (FS, 2010). Sediment delivery to Wall Creek is expected to be minor and localized with continued implementation of the Forest Plan (1990), PACFISH, and BMPs.

The 2010 TMDL covers the 2004/2006 list of 303(d) water quality impaired streams as it was the most current edition at the time the TMDL was written. DEQ postponed the sedimentation TMDL because the agency was trying to develop reliable quantitative methods and benchmarks for this pollutant.

Riparian Areas

Land management practices, such as timber harvest, mining, road construction, as well as grazing often encroach into riparian areas and water bodies. Consequently, some stream systems on the Forest have become simplified and characterized by inadequate riparian vegetation, lack of large wood, channel incision and filling, all of which can have a negative effect on water quality. The current state of watershed and aquatic ecosystems on Forest Service lands is a culmination of past land management practices along with an emphasis on watershed protection and restoration since adoption of the PACFISH conservation strategy (USDA and USDI, 1995). Federal land is generally experiencing fewer alterations than non-federal lands, and is recovering since implementation of this conservation strategy.

Water quality protection on FS lands in the John Day basin has improved in recent years as a result of changes in management motivated by direction in PACFISH, ESA fish listings and recovery plans, implementation of water quality BMPs, direction in the Regional Aquatic Restoration Strategy (USDA, 2007), and through restoration investments. Examples include: increased emphasis on

protecting streamside areas to reduce impacts to shade producing vegetation and stream channels as well as repairing and removing unstable roads.

Structural and non-structural range improvements, modified grazing strategies and implementation of utilization standards have resulted in reduced use levels in riparian areas leading to definite signs of recovery in many riparian systems.

The following photo points were taken as part of the PIBO implementation monitoring. Figure 3-1 are photographs taken at key areas/DMA at the end of the grazing season. Figure 3-2 displays two additional representative end-of-season photos taken in 2011 on South Fork Wall Creek in the Wildhorse Pasture. These areas are representative of the streams in the Tamarack Allotment where livestock use or overuse would first become evident. These photos, in conjunction with monitoring data, demonstrate that current management is consistently not exceeding implementation (allowable use) standards in riparian areas.

Figure 3-1: 2010 end of season photographs at the Tamarack Creek DMA in the Stalling Butte Pasture.

Figure 3-2: 2011 end of season photographs of South Fork Wall Creek in the Wildhorse Pasture.

Approximately 6 miles of riparian areas have been fenced on the allotment to exclude cattle from streams. In Big Wall Creek 2.5 miles was fenced in 1978; 3 miles on the South Fork Wall Creek in 1999; and 0.5 miles on Dark Canyon Creek in 1999. Cattle do not have access to the mainstem of Wall Creek which is fenced through the Tamarack allotment. Fencing has been strategically located to protect key resource values, such as spawning habitat and improve resource conditions and has facilitated the management of cattle on the allotment (Moreau, 2013). The mainstem of Big Wall

Creek within the Tamarack allotment has been completely fenced since 1978. Fence was constructed on SF Big Wall Creeks and Dark Canyon Creek in 1999-2000.

As evidenced by monitoring data and photos, the riparian areas are continuing to recover since the mid 1970's (Figure 3-3 and Figure 3-4). The photos below were taken in the Hardman Allotment just downstream in Big Wall Creek. These photos are indicative of the change in riparian conditions within the Tamarack allotment along fenced perennial streams between 1976 and 2003. Changes in grazing management after the 1990 Forest Plan and PACFISH (USDA and USDI, 1995) have resulted in improving riparian conditions.

Figure 3-3: Big Wall Creek in the Monument Allotment in 1976.

Figure 3-4: Big Wall Creek in the Monument Allotment in 2003.

The Tamarack Allotment lies within the Heppner big game management unit (see wildlife report in project record). The elk population in this unit has been increasing with numbers doubling over the last nine years (2006-2015). It is estimated that there are several hundred elk that summer and winter in the allotment. A recent study of cottonwood recruitment along the Middle Fork of the John Day River found that "while the general paucity of small to intermediate height classes of cottonwoods along the study reach may be primarily due to long-term effects of cattle grazing, increasing numbers

of wild ungulates in recent decades represent an additional confounding factor for managers and policymakers to consider (Betscha and Ripple, 2005). Beaver reductions by the end of the 19th century and their current scarcity are also believed to have greatly reduced habitat for riparian hardwoods. There is also a paucity of large wood throughout the system.

Environmental Consequences

Alternative 1

Under the No Grazing Alternative, livestock would no longer be authorized within the project area; the Tamarack Allotment would be vacated. Improvements such as fences, gates and pipelines would be removed, as time and funding allows. However, if these improvements are identified as important for other resource needs they would remain in place.

Direct and Indirect Effects

Under the Alternative, 1 cattle grazing would no longer occur within riparian areas. Cattle would not be consuming upland and riparian vegetation or walking through stream channels.

No livestock grazing would improve the functioning condition of riparian vegetation. Over time, riparian and upland shrub recruitment may increase in the absence of cattle grazing where other ungulates do not frequent. Increased shading may result in localized amelioration of stream temperatures and DO in these streams, but likely will not have a measurable effect downstream of sites or on Big Wall Creek temperatures within the next 10 years.

Monitoring of streambank conditions conducted since 1991 demonstrate streambank stability has primarily been above the PACFISH minimum of 80 percent bank stability. While the stability measures meet current standards, eliminating cattle would reduce trampling, stream bank erosion and sediment input.

Cumulative Effects

While cattle would not be consuming upland and riparian vegetation or walking through stream channels, the impacts of wild ungulates currently numbering well above historic levels would continue. Removal of existing boundary, pasture division and riparian exclosure fencing used to improve cattle distribution in the uplands would result in elk being able to move across the landscape more easily. Elimination of upland water sources would have a negative impact on the distribution of elk in the allotment. Elk would spend a greater portion of their time in riparian habitat (See wildlife report). Historic land management has reduced hardwoods in riparian areas which have been replaced with conifers. These are well established communities which would likely continue even after the removal of cattle.

Previous management as well as increased populations of elk have impacted stream channels and riparian vegetation. These effects will continue even after cattle are removed so it is likely that there would not be a measureable benefit to the resource indicators though there may be small areas of localized riparian vegetation improvement.

Ongoing grazing in adjacent allotments within the watersheds and other management activities including road construction, closures, improvements and decommissioning; prescribed fire and wild fire as well as recreational use including trails would continue within the watershed. Utilization of BMPs and appropriate design criteria for these management activities will assure compliance with the FS obligations under the Clean Water Act (CWA).

Alternative 2

This alternative continues current management with a maximum of 209 calf/cow pairs on a deferred rotation grazing system from May 1 to September 15. Management can be modified or adjusted within these stocking and seasonal parameters. Alternative 2 is described in detail in the EA. Activities associated with the cattle that could impact water quality and riparian areas include grazing, fence construction, and use of motorized equipment for maintenance of water sources.

Functioning upland water developments are critical for the continued management of livestock on the allotment. There are currently 62 water developments (pond and spring developments) within the allotment. Maintenance of ponds could involve removing silt and debris from ponds, along with dam and spillway improvements. Maintenance is usually performed with heavy equipment. Performing maintenance on springs often involves heavy equipment used to improve the water collection system and installing underground pipe from the water collection system to the water trough and overflow.

Direct and Indirect Effects

Under the Alternative 2 cattle would continue to graze, consuming upland and riparian vegetation, and walking through unfenced stream channels. Direct effects would include loss of vegetative cover, upland ground disturbance and compaction, and bank erosion. The type and magnitude of the direct effects to water quality, sediment and riparian areas is not expected to change, as this alternative reflects current management.

The Tamarack allotment has consistently met prescribed utilization standards for the allotment (See range report). Stubble height and woody browse at Designated Monitoring Areas have consistently met end-of-season utilization standards on the allotment since 2008 (Moreau 2013). The 2013 Tamarack, Hardman, Little Wall and Monument Livestock Grazing Allotments Biological Assessment indicates that implementation monitoring for end-of-season stubble height, percent bank alteration, herbaceous utilization and woody shrub utilization were met every year each time they were reviewed. The monitoring results indicated that the Tamarack Allotment has been in compliance with the implementation standards found in the Umatilla Forest Plan.

Figure 3-1 and Figure 3-2 in the previous Existing Condition discussion were taken at key areas/DMA at the end of grazing season. These areas represent streams in the Tamarack Allotment where livestock use or overuse would first become evident. Changes in grazing management after the 1990 Forest Plan and PACFISH (USDA, USDI, 1995) have resulted in improving riparian conditions in fenced reaches. These photos, in conjunction with monitoring data, demonstrate that current management is consistently not exceeding implementation (allowable use) standards in riparian areas. Effects on water quality parameters of stream temperature, DO and pH are anticipated to be static under this alternative, reflecting current management.

The mainstem of Big Wall Creek is also water-quality limited for sediment. As discussed, the mainstem of Big Wall Creek is fenced; therefore, cattle are not trampling within the enclosure resulting in sediment delivery. Trampling by cattle will continue in unfenced streams, including intermittent and ephemeral channels. Potential instream disturbances would include substrate trampling, bank erosion and manure delivered into the stream system. No streams are listed for exceeding the bacteria standards, including E.coli.

Ground disturbance, loss of vegetative cover and compaction would occur primarily around watering areas, bedding areas and corrals. Other areas of compaction would include trailing around fenceline. These areas would have increased vegetation removal and soil erosion. Maintenance of fences and water sources have the potential for generating localized areas of disturbance. Effects are consistent with current management and would be expected to be short- term and associated with the initial

disturbance. Effects on the sediment regime as well as riparian condition in the Tamarack Allotment are expected to be static under this alternative reflecting current management.

Cumulative Effects

Cumulative effects would be the same as current management. Past activities and events in the planning area watersheds include: timber harvest other grazing allotments, elk, road construction, closures, improvements and decommissioning; wildfire and prescribed fire as well as recreational use, including trails.

Wild ungulates would continue consuming upland and riparian vegetation and walking through stream channels within the Tamarack Allotment. The impacts of elk currently numbering above historic levels would continue. Upland ground disturbance and compaction, bank erosion and loss of vegetative cover would continue delivering sediment downstream. The magnitude and duration of these impacts alone are unknown.

The Little Wall Allotment and Hardmen Allotments within the Wall Creek watershed and Monument Allotment within the Wall Creek and Lower John Day River-Kahler Creek watersheds have similar management histories with overgrazing. Current management is similar to that of the Tamarack Allotment and resulting effects to water quality and sediment. The management of these allotments include BMPs to meet Forest Plan standards.

Roads within riparian areas can also detrimentally impact streams and aquatic habitats by reducing large wood to streams, reducing stream shade and being a chronic source of fine sediment. Based on the a quantifiable sediment analysis, the 2012 Wall Creek Road and Watershed Improvement EA identified focused treatments on the highest risk road segments, drain points and stream crossings. Within the Tamarack Allotment this included approximately 1.5 miles of road reconstruction and three culvert replacements. These treatments would create a short term flush of sediment, but a reduction in long-term chronic sediment rates.

Legacy impacts from these management activities can create linear areas of unobstructed travel such as skid trails or native surfaced roads which can encourage use by both cattle and wild ungulates creating localized erosion and potential sediment delivery to streams.

Past vegetation treatments in the Tamarack Allotment include: pre- commercial thinning, single-tree selection, overstory and partial tree removal. RHCA vegetation treatments were conducted along perennial and intermittent streams. The Kahler Dry Forest Restoration Project is within the allotment boundary and is slated for implementation over the next five years to ten years.

Vegetation and mechanical fuel treatment activities authorized through the Rim Rock timber sale were proposed outside of the RHCAs and are consistent with Forest Plan direction regarding native fish populations. These management activities can degrade water quality and increase sediment delivery. These projects would include project design criteria and BMPs to meet Forest Plan standards per applicable PACFISH objectives and guides.

Ongoing grazing in adjacent allotments within the watersheds and other management activities including road construction, closures, improvements and decommissioning; prescribed fire and wild fire as well as recreational use, including trails would continue to impact water quality and the sediment regime within the watershed. Utilization of BMPs and appropriate design criteria for these management activities will assure compliance with the FS obligations under the CWA.

Alternative 3

This alternative continues current management with a maximum of 209 calf/cow pairs on a deferred rotation grazing system from May 1st to September 15th. Management can be modified or adjusted within these stocking and seasonal parameters. Alternative 3 is described in detail in the EA. Additional fencing would be placed along Dark and Lost Canyon Creeks as needed and as funding allows. Activities associated with the cattle grazing that could impact water quality and riparian areas include fence construction and maintenance, use of motorized equipment for maintenance and water developments construction and maintenance.

There are currently 62 water developments (pond and spring developments) on the allotment. Maintenance of ponds could involve removing silt and debris from ponds along with dam and spillway improvements. Maintenance is usually performed with heavy equipment. Performing maintenance on springs often involves heavy equipment used to improve the water collection system and installing underground pipe from the water collection system to the water trough and overflow. This alternative would add up to nine more water developments in addition to maintaining the existing upland water developments.

Direct and Indirect Effects

Under Alternative 3, additional fencing would be placed along Dark and Lost Canyon Creeks as needed and as funding allows. The additional fencing will allow riparian vegetation along these creeks to recover more quickly than current management. Increased shading may result in localized amelioration of stream temperatures and DO in these streams, but likely will not have a measurable effect downstream of sites or on Big Wall Creek temperatures. Additional water sources will facilitate movement of cattle from sensitive riparian areas.

The mainstem of Big Wall Creek is also water-quality limited for sediment. Ground disturbance, loss of vegetative cover and compaction would occur primarily around water areas, bedding areas and corrals. Other areas of compaction would include trailing around fence line. These areas would have increase vegetation removal and soil erosion. Potential instream disturbances would include substrate trampling and manure delivered into the stream system. No streams are listed for exceeding the bacteria standards, including E.coli.

As discussed, the mainstem of Big Wall Creek is fenced; therefore, cattle are not trampling within the enclosure creating bank erosion resulting in direct sediment delivery. Trampling by cattle in unfenced streams, including intermittent and ephemeral streams, will continue to deliver sediment to the stream system.

Installation and maintenance of fences and water sources have the potential for generating localized areas of disturbance. Effects are expected to be short-term and associated with the initial disturbance. Additional developments would draw cattle away from sensitive riparian areas which could reduce impacts to riparian vegetation and stream banks.

Sediment delivery along newly fenced sections of Canyon Creek and Lost Creek in the Tamarack allotment are expected to decrease, as fencing will prevent trampling and vegetative consumption by cattle.

Cumulative Effects

Cumulative effects are similar to Alternative 2. Past activities and events in the planning area watersheds include: timber harvest, other grazing allotments, elk, road construction, closures, improvements and decommissioning; wildfire and prescribed fire as well as recreational use, including trails.

Wild ungulates would continue consuming upland and riparian vegetation or walking through stream channels within the Tamarack allotment and as well as other allotments within the watershed. The impacts of elk currently numbering above historic levels would continue. Upland ground disturbance and compaction, bank erosion and loss of vegetative cover would continue delivering sediment downstream. The magnitude and duration of these impacts alone are unknown.

The Little Wall Allotment and Hardmen Allotments within the Wall Creek watershed and Monument allotment within the Wall and Lower John Day River-Kahler Creek watershed have similar management histories with overgrazing. Current management is similar to that of the Tamarack allotment and resulting effects to water quality and sediment. The management of these allotments include BMPs to meet Forest Plan standards.

Roads within riparian areas can also detrimentally impact streams and aquatic habitats by reducing large wood to streams, reducing stream shade and being a chronic source of fine sediment. Based on the a quantifiable sediment analysis, the 2012 Wall Creek Road and Watershed Improvement EA identified focused treatments on the highest risk road segments, drain points and stream crossings. Within the Tamarack allotment this included approximately 1.5 miles of road reconstruction and three culvert replacements. These treatments would create a short term flush of sediment but a reduction in the long-term chronic sediment rates.

Legacy impacts from management activities which create linear areas of unobstructed travel such as skid trails or native surfaced roads can encourage use by both cattle and wild undulates which can create localized erosion and potential sediment delivery to streams.

Past vegetation treatments in the Tamarack Allotment include riparian treatment consisting of pre-commercial thinning, single-tree selection, overstory and partial tree removal. RHCA vegetation treatments were conducted along perennial and intermittent streams. The Kahler Dry Forest Restoration Project is within the allotment boundary and is slated for implementation over the next five years to 10 years.

Vegetation and mechanical fuel treatment activities authorized through the Rim Rock timber sale were proposed outside of the RHCAs and are consistent with Forest Plan direction regarding native fish populations. These management activities can degrade water quality and increase sediment delivery. These projects would include project design criteria and BMPs to meet Forest Plan standards per applicable PACFISH objectives and guides.

Ongoing grazing in adjacent allotments within the watersheds and other management activities including road construction, closures, improvements and decommissioning; prescribed fire and wild fire as well as recreational use including trails would continue to impact water quality and the sediment regime within the watershed. Utilization of BMPs and appropriate design criteria for these management activities will assure compliance with the FS obligations under the CWA.

Summary of Environmental Effects

Alternative 1 (No Grazing) would do the most to reduce cattle impacts to water quality within the Tamarack Allotment, but does not meet the Purpose and Need of the project. Under this alternative, increased shading may result in localized amelioration of stream temperatures and DO in these streams, but likely will not have a measurable effect downstream of sites or on Big Wall Creek temperatures within the next ten years. Alternative 3 provides more protection of riparian areas by fencing and placing upland water sources than Alternative 2, which reflects current management.

The John Day River Basin Water Quality Restoration Plan (WQRP), serving as the TMDL Implementation Plan, is consistent with and builds upon existing management plans and strategies

including the UMF Plan, PACFISH, and the National BMP program, in providing for management and restoration of riparian and aquatic resources to attain water quality standards and meet the intent of the CWA. The FS adheres to current policies and regulations which require design criteria, BMPs and adaptive management to improve water quality. A complete list of design criteria and BMPs are provided in the EA. All Alternatives are consistent with the direction provided in the WQRP and the CWA.

3.4 FISHERIES

This section incorporates by references the fisheries report located in the project file. This report contains the data, methodologies, analysis, maps, reference, and technical documentation that the specialist relied on to reach the conclusions discussed in this section.

Scale of Analysis

Tamarack Cattle Allotment Project activities occur in the Kahler Creek-John Day River watershed (within the Upper Kahler Creek subwatershed 170702040103, Haystack Creek-John Day River subwatershed 17072040105, and Bologna Canyon Creek subwatershed 170702040101) and the Wall Creek watershed (within the Upper Big Wall Creek subwatershed 170702020805) (Table 3-7 and Figure 3-5). A description of the Upper Kahler Creek subwatershed, Upper Big Wall Creek subwatershed, and Bologna Creek subwatershed are found in the Tamarack, Hardman, Little Wall and Monument Livestock Grazing Allotments Biological Assessment (Moreau 2013) on file at the Heppner Ranger District and will not be repeated here. See Table 3-7 for acreage of each subwatershed present on the Tamarack Allotment.

The geographical context for estimating direct and indirect effects is National Forest System (NFS) lands located within the Upper Kahler Creek Watershed, Upper Big Wall Creek Watershed, Haystack Creek-John Day River Watershed and Bologna Canyon Creek, and those areas directly affected by implementation of forest vegetation, in-stream restoration and fire/fuels management activities included in action alternatives. Analysis of indirect effects considers the influence of direct effects occurring at a different time or place than the direct effects themselves. The temporal context for evaluating environmental effects considers past, present, and reasonably foreseeable actions in the Tamarack Grazing Allotment management area, as described below.

Resource Indicators and Issues

The resource indicators used in this analysis include water quality measured by temperature, dissolved oxygen, pH, and sediment. End-of-season stubble height, percent bank alteration, herbaceous utilization and woody shrub utilization was used to measure the change to riparian areas based on the Proposed Action. This fisheries and aquatic species analysis will tier to the key issues of water quality and riparian areas described in the hydrology report and identified during project scoping. Water quality parameters that could be affected by cattle grazing include temperature, dissolved oxygen, pH and sediment. In addition, potential direct impacts from cattle grazing to spawning Endangered Species Act (ESA)-listed Middle Columbia River steelhead and redds and other aquatic species will be analyzed.

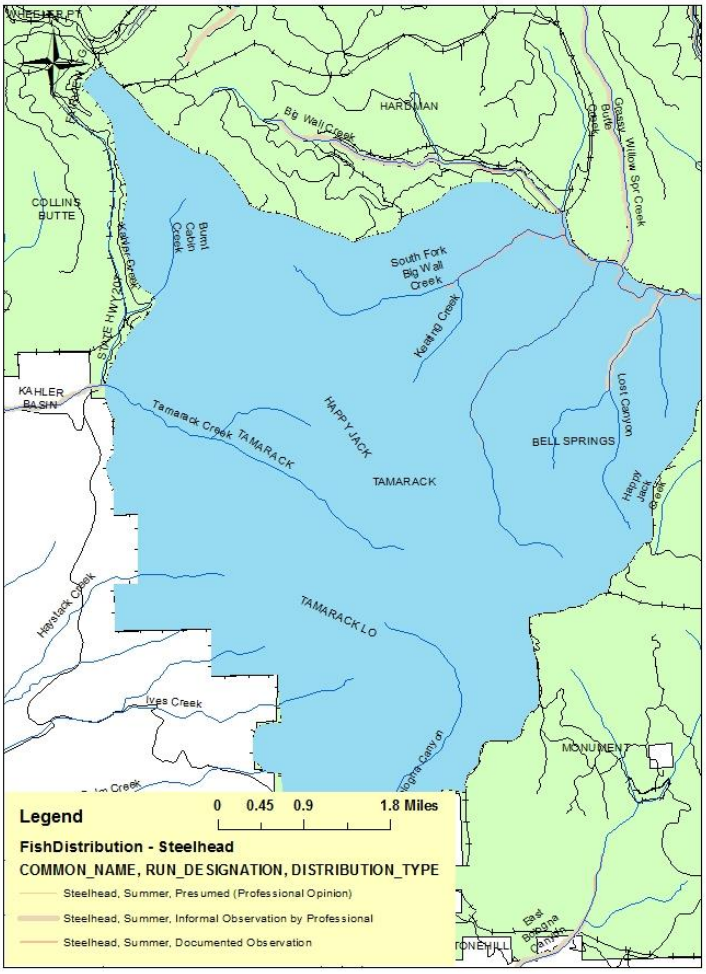
Resource indicators were chosen to determine potential impacts to the issues of water quality and riparian areas are described in the hydrology report and are summarized in this report. Potential impacts to spawning fish and/or redds are also discussed. The current number of cows grazing would not change under Alternative 2 and 3. Grazing would not occur under Alternative 1.

Affected Environment

Federally Listed Threatened, Endangered and Sensitive (TES) Fish and Habitat

Middle Columbia River (MCR) steelhead and their designated critical habitat (DCH) are the only species and habitat listed under the Endangered Species Act (ESA), which are found in the allotment area (Fig. 2). In 2016 spawning was observed in Lost Canyon where two redds were identified, however; this is the first year that redds have not been found in Dark Canyon Creek or South Fork Big Wall Creek (pers. comm. Tom Fritz 5/11/2016). No redds have ever been found in Tamarack Creek due to a box culvert under Highway 207 that acts as a fish barrier (T. Fritz 2016). Maps do not reflect the 2016 Lost Canyon survey information.

Figure 3-5: Middle Columbia Steelhead DCH and Observed Presence



Management Indicator Species

Management Indicator Species (MIS) are defined in the Umatilla Land and Resource Management Plan (1990) "A species selected because its welfare is presumed to be an indicator of the welfare of other species using the same habitat…" Habitat conditions in the forest are managed for MIS species. Middle Columbia River (MCR) steelhead and redband trout are both Forest management indicator species (MIS) and are present in the Tamarack Allotment. Redband have been observed in the same locations as MCR steelhead (e.g. Big Wall, South Fork Big Wall, and Dark Canyon Creeks) (Figure 3-6 and Table 3-10).

Figure 3-6: Management Indicator Species Redband Locations in Tamarack Allotment

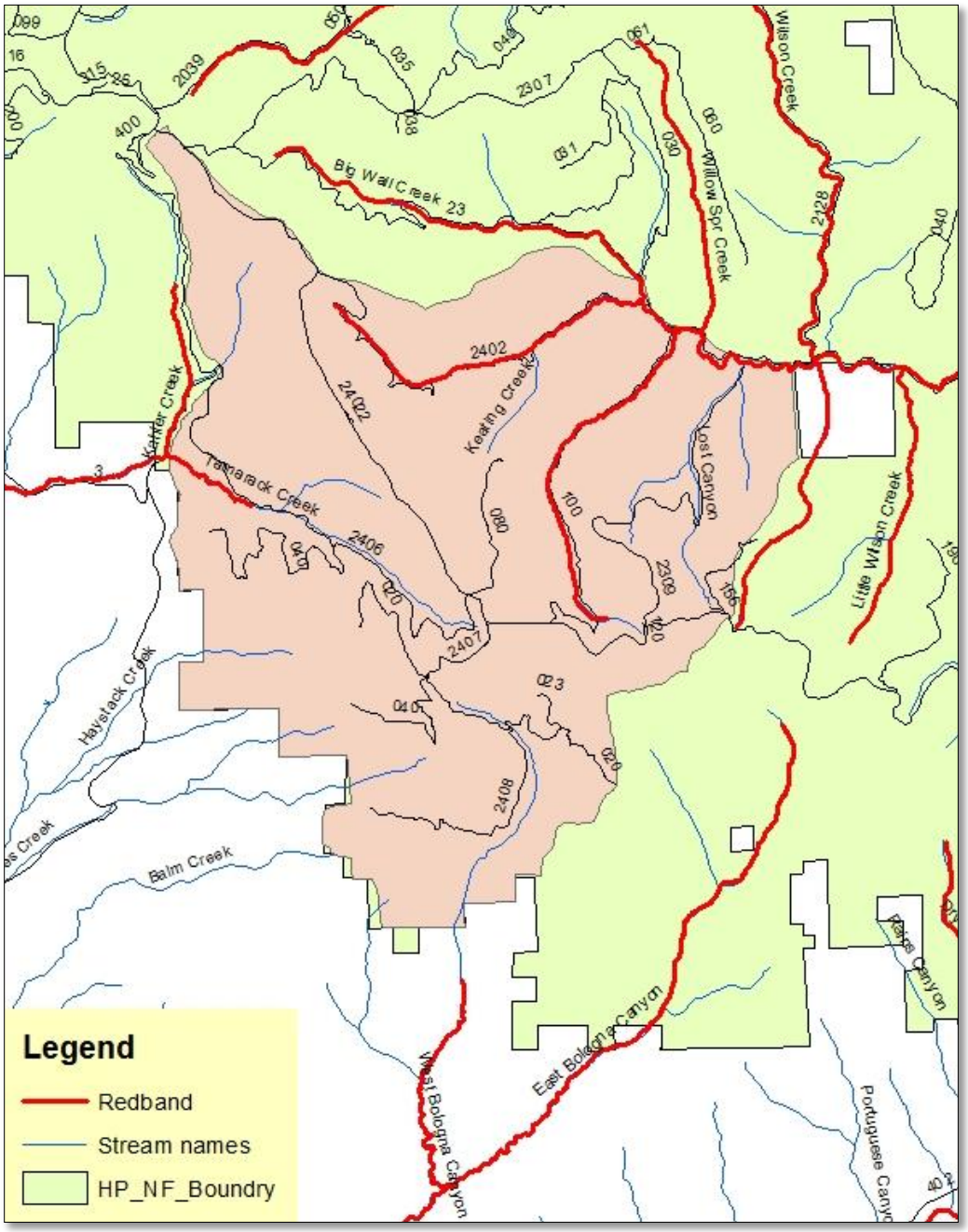


Table 3-10: Miles of MCR Steelhead designated critical habitat (DCH) in the Tamarack Allotment area and spawning and rearing habitat by total stream miles.

Subwatershed	Stream Name	Total Stream Miles	DCH (Miles in Allotment)	Spawning and Rearing (Miles)
Upper Kahler	Tamarack Creek	3.69	0	0.0
Upper Big Wall	S.F. Big Wall Creek	3.38	0.72	1.43
	Dark Canyon Creek	4.2	2.65	2.48
	Lost Canyon	2.0	0	1.0

The North Fork John Day (NFJD) summer steelhead population is distinct, but part of the larger John Day River Major Population Group (MPG) within the Middle Columbia River Steelhead ESU. This population of steelhead occupies the highest elevation, and wettest area in the John Day basin.

According to the 2016 "Five-Year Review: Summary and Evaluation of Middle Columbia River Steelhead," Middle Columbia River steelhead the John Day River Lower Mainstem Tributaries, North Fork John Day River, and either the Middle Fork John Day River or John Day River Upper Mainstem populations should achieve at least viable status (NOAA 2016). There have been improvements in the viability ratings for some of the component populations, but the Middle Columbia River steelhead designated population segment is not currently meeting the viability criteria described in the "Middle Columbia River Steelhead Recovery Plan" (NOAA 2016). This analysis was based on population abundance/productivity and spatial structure/diversity.

Abundance/productivity is based on adult spawner returns and smolt to adult ratios (SAR). Spatial structure/diversity is based on analysis of spatial extent or range of the population, genetic variation, spawner composition, population connectivity and major life history strategies. Although the NFJD summer steelhead population is rated as highly viable and meeting recovery goals, the John Day River MPG remains below viable status due to the "maintained" population status on the Lower John Day. Designated critical habitat for Middle Columbia River steelhead within the NFJD subbasin includes all rivers and stream reaches accessible to steelhead below long-standing natural barriers (Federal Register Vol. 70 (170); September 2, 2005).

Regional Sensitive Species

A number of sensitive invertebrate and aquatic vertebrate species are known or suspected on the Umatilla National Forest, and their known or suspected presence in the Project area is described in Table 3-11. One Sensitive Species is the anadromous Pacific lamprey. Pacific lamprey have been documented in Granite Creek, a high-elevation tributary to the North Fork John Day River. Pacific lamprey are not documented in the analysis area, but are documented in the John Day River approximately 5.5 miles downstream. Additional species habitat requirements are on file.

Table 3-11: Regional Forester's List of Sensitive Invertebrate and Vertebrate Species Present or suspected on the Umatilla NF and the Heppner Ranger District.

Regional Sensitive Invertebrate	Habitat Description*	Habitat Present in Analysis Area	Species Present in Analysis Area	Known Current Distribution
Western Ridged Mussel *(Gonidea angulata)*	Occur in streams of all sizes of low to mid-elevation watersheds. Common in stable stream reaches, tolerant of fine sediments and occupy depositional areas.	Yes	Observed in lower Big Wall Cr. below the project area and present in lower Ditch Creek.	Widely distributed west of the Continental Divide, CA to BC. It is mainly distributed east of the Cascades.
Shortface Lanx *(Fisherola nuttalli)*	Occurs in large low to mid-elevation riverine habitats. Common in unpolluted, cold, well oxygenated, perennial streams with cobble-boulder substrate.	No	No	Found throughout the Snake River, Mid-Columbia basin limited to the Upper and Lower Deschutes, Lower John Day, Upper Columbia (Okanagan R.)
Columbia clubtail *(Gomphus lynnae)*	A variety of river habitats, which can range from sandy or muddy or rocky, shallow rivers with occasional gravelly rapids. Water flow tends to be slow-moving.	Suspected in the project area.	Suspected and assumed present in the analysis area.	Yakima River, Benton Co. John Day River, Wheeler and Grant Co. from Twickenham to Monument, Owyhee River, Malheur Co.
Pacific Lamprey *(Entosphenus tridentatus)*	A variety of river habitats, which range from sand, mud or rocky, shallow rivers with gravelly rapids.	No.	No, the project is near known and suspected range.	Found from the Pacific Coast of North America and Asia.
Westslope Cutthroat Trout *(Oncorhynchus clarkii lewisi)*	Cold clear, water, high mountain streams with variable habitat complexity	No	No, the project is outside the historic, and suspected range	Found throughout the Mid-Columbia River Basin, NFJD and Upper John Day River subbasins

*Frest and Johannes 1995, Nedeau et al. 2009, Neitzel and Frest 1990, NatureServe Explorer 2009, Paulson 1999, Scheuering 2006, forest stream survey data (on file).

Existing Condition

Stream surveys from the early 1990s only qualified stream substrates (i.e. substrate consisted of primarily cobble and sand) and did not perform Wolman pebble counts. In later stream surveys Wolman pebble counts were conducted in riffles and are intended to characterize substrate composition and percent fines throughout the bank full streambed. The Wolman pebble count protocol assesses substrate distribution between the bank full margins of the stream including outer margins of the streambed that are dry at low flow.

Substrate embeddedness is a highly subjective measurement and especially difficult to estimate in most of these stream reaches given the gradient, flow, geology and existing riparian condition of the majority of stream reaches in the analysis area; several stream reaches are in existing meadow complexes where the substrate percent fines are expected to be high. The majority of stream reaches within the analysis area have a dominant substrate of sand and cobble with some gravel.

Impacts to fisheries and stream habitats associated with improperly grazed livestock have been well documented in scientific literature and by state and federal agencies (Case and Kauffman, Emmerich and Heitschmidt 2002, George et al. 2002, Kauffman and Krueger 1984; Clary and Webster 1990, Clary 1999, Platts 1991, Platts and Nelson 1985, Skinner 2003). Due to these potential impacts, guidelines have been developed for moving livestock through a pasture rotation established by easily measured indicators that deal directly with livestock effects on stream channels and riparian vegetation. Predicted effects are also based on past monitoring results. Implementation monitoring is used to ensure compliance with Best Management Practices (BMPs) and assure Forest Plan stubble height and utilization standards are being met. As described in the monitoring section in the range specialist report and PIBO EM objectives, past results of monitoring utilization standards in riparian areas also support conclusions of effects of the proposed grazing project.

Successful management of allotments to protect or improve riparian areas depends, in part, on adequate forage away from riparian areas, effective riparian exclosures (Platts and Nelson 1989, Platts 1991), alternative water source development, and management of stock by permittees. In degraded riparian areas, it has been shown that stream conditions improved through commitment of livestock permittees and their riders, agencies, and the interested public (Bengeyfield 2006, Bayley and Li 2008). Range activities on the Tamarack Allotment are closely managed (fencing, 62 upland water developments, pasture rotation, salting and riding); thereby reducing the potential for impacts to ESA listed fish and their critical habitats and other aquatic species. This is due primarily but, not exclusively to, Best Management Practices (BMPs) (see EA for complete listing) and project-specific design criteria applied uniformly across the project area, together with proposed conservation measures.

Based upon field reviews of the allotment and considering past studies (Spence et al. 1996 and Platts 1991), the primary potential impacts on the Tamarack Creek Allotment would be grazing near or on stream banks and removing and/or trampling associated vegetation along stream reaches that are not excluded from cattle use, and possibly chemical contaminants due to livestock waste.

Given the small wetted width of the majority of these stream channels and existing hydrograph (see hydrology report), percent side channel habitat is minimal in most of the stream reaches.

Upper Big Wall Creek Subwatershed (107702020805)

The headwaters of Dark Canyon, Lost Canyon, and South Fork Big Wall Creeks are located within the allotment boundary. Stream survey data (1994, 1993, and 2013 respectively) are available for these creeks. In R6 standard habitat and species distribution surveys have not been performed on all streams; however, a redd survey was conducted in area creeks. Big Wall Creek is MCR steelhead DCH and meanders along the northeast boundary of the allotment where steelhead have been observed. South Fork Big Wall and Dark Canyon Creeks are DCH for MCR steelhead. Dark Canyon Creek is DCH and was surveyed in 1994 where juvenile and adult fish were observed. South Fork Big Wall Creek was surveyed in 1994 and fish were also observed.

Upper Kahler Creek Subwatershed (107702040103)

The headwaters of Tamarack Creek are located within the allotment boundary. Stream survey data (1991 and 2013) are available for this creek. This creek is designated a Class I stream. No fish have been documented during biological stream surveys. No other subwatersheds in the Tamarack Allotment have streams with observed steelhead or DCH.

Under the Section 7 Habitat Monitoring Protocol for the Upper Columbia River Basin (USDA 1994), PACFISH RMO's are intended to apply to Rosgen (1996) C-type channels. For example, monitoring protocol for determining pool frequency requires count of only pools greater than 1 meter (~3 feet) in low gradient (1 percent -2 percent) stream channels.

Table 3-12: Calculated ICBEMP pool frequency values (McKinney et al. 1996)

Wetted Width (ft.)	0-5*	5-10	10-15	15-20	20-30	30-35	35-40	40-65	65-100
Pools/mile**	39*	20	12	8.4	5.9	4.5	3.9	2.8	1.8

*Streams less than 5 feet wide, reaches would be expected to have a lower density of pools; however, there is no available way to calculate an appropriate value so standard would defer to the value of 39 pools per miles selected by the USFWS.

**To calculate the standard pools/mile using ICBEMP value of 0.028 for specific widths 147.8/channel width = standard pools/mile.

Habitat and watershed condition elements that may be affected by management of this allotment are temperature, sediment transport, width to depth ratios and streambank condition. Water quality, habitat quality, and the ability of the watershed and riparian areas to act as a buffer to grazing activity and its connected actions are components of aquatic habitat considered in this analysis. These habitat parameters are specifically addressed as PACFISH Riparian Management Objectives (RMOs) (referencing Section 7 Fish Habitat Monitoring Protocol for the Upper Columbia River Basin, USDA Forest Service, 1994), and are summarized in Table 3-13. These objectives are part of determining the complexity of habitat available for fish within the analysis area.

Table 3-13: PACFISH RMO's (UNF and LRMP as amended by PACFISH, 1995)

Habitat Feature	Riparian Management Objectives
Pool Frquency[1]	Wetted width (ft.) 10 20 25 50 75 100 125 150 200 Number pools/mile 96 56 47 26 23 18 14 12 9
Water Temperature	Compliance with Water Quality standard or maximum Temp. <68 ºF
Large Woody Debris	> 20 pieces/mile, >12 inch diameter, >35 ft. length
Bank Stability	>80 percent stable
Width/Depth Ratio	<10, mean wetted width divided by mean depth

There are approximately 44 miles of fencing in the Tamarack Allotment, and approximately six (6) miles of riparian areas have been fenced on the allotment to exclude cattle from streams. The streams fenced off from cattle are South Fork Big Wall Creek (approximately 2.3 miles), Big Wall Creek (approximately 1.94 miles), and Dark Canyon Creek (approximately 0.48 miles) (Figure 3-7). Fencing has been strategically located to protect key resource values such as steelhead spawning habitat and improve resource conditions, and has facilitated the management of cattle on the allotment. A combination of fencing to control or eliminate access of cattle to riparian areas, upland water developments, and implementation and effectiveness monitoring are used to assure there are no adverse effects to ESA listed species and their DCH.

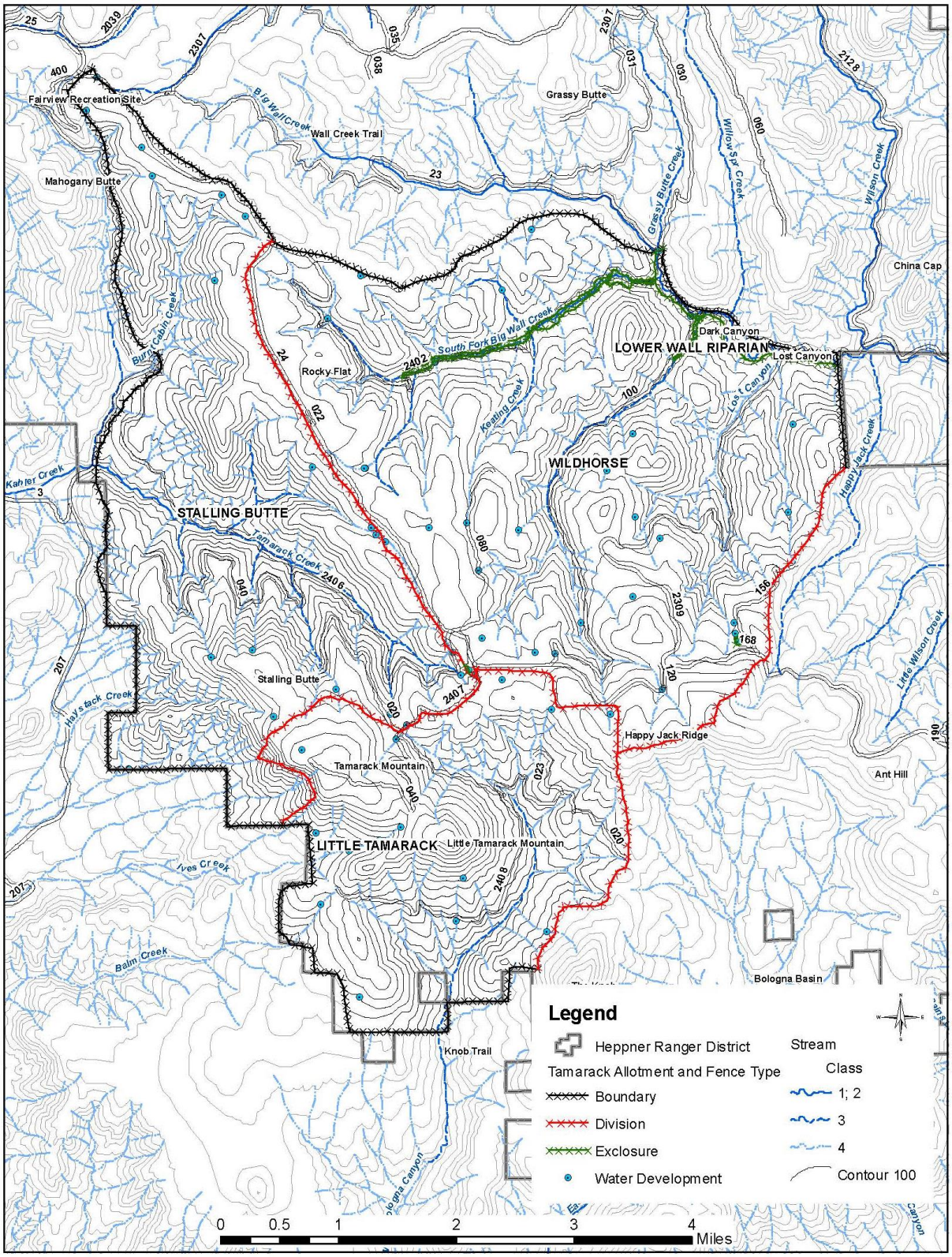


Figure 3-7: Cattle fencing and exclosures in Tamarack Allotment.

Temperature

Only Big Wall Creek has had continuous temperature monitoring in the Tamarack Allotment (Table 3-14). See Hydrology, Section 3.3 for more temperature analysis of Big Wall Creek.

Table 3-14: Big Wall Creek 7-day maximum temperature.

Year	95	96	97	98	99	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14
Temp º F	77	68	68	77	76	74	75	74	71	77	74	74	74	72	74	74	71	75	77	75

A description of PACFISH RMOs and status is found in the 2015 Biological Assessment.

Table 3-15: Current status of PACFISH riparian management objectives and trends for fish bearing streams in the analysis area.

Stream	Temp (°F)	RMO** Pools/ mile	ICBEMP Pool/mile	Bank Stability	Width: Depth Ratio
Big Wall Creek	67-79	No data	<39	>80%	18-30
Dark Canyon Creek	52-72	4.8	<39	<80%	10
Lost Canyon Creek*	No data	No data	No data	No data	No data
South Fork Big Wall Creek	No data	7.9	<39	<80%	9.7
Tamarack Creek	52-54.5	2.6	<39	>80%	<10

**Many streams within the analysis area do not meet the minimum channel width requirements to calculate pool frequency PACFISH RMOs.

*No Data- data not available to indicate meeting PACFISH RMO

Table 3-16: Summary of cattle access to perennial streams in the Tamarack allotment and use of fencing to protect spawning ESA listed MCR steelhead, redds and to prevent direct effects.

Stream	HUC 6	Spawning	Designated Critical Habitat	Management Elements that Limit or Eliminate Cattle Interaction with Spawning MCR Steelhead or Access to Riparian Areas with DCH	Pasture
Big Wall Creek	Middle Big Wall	Yes	Yes	Approximately 2.5 miles of Wall Creek has been excluded from the Wild Horse pasture, called the Tamarack Lower Wall Creek Riparian Pasture. This pasture is typically not part of the annual grazing schedule and is rested. However, if this pasture was to be grazed it would be grazed after July 15th by not more than 25 head for less than 10 days. DMA	Tamarack Lower Wall Creek Riparian Pasture
South Fork Big Wall Creek	Middle Big Wall	Yes	Yes	Approximately 3 miles of stream has been fenced to exclude cattle from accessing MCR spawning and DCH for steelhead. Cattle are not authorized to graze this exclosure. DMA	Wildhorse Pasture

Stream	HUC 6	Spawning	Designated Critical Habitat	Management Elements that Limit or Eliminate Cattle Interaction with Spawning MCR Steelhead or Access to Riparian Areas with DCH	Pasture
Dark Canyon	Middle Big Wall	Yes	Yes	The lower 1.2 miles of Dark Canyon creek have verified steelhead spawning. Approximately 2.1 miles is DCH for MCR steelhead. Spawning habitat above the FS 2300100 RD (~ river mile 1.2) not suitable given large embedded substrate and step pool habitat. Approximately 0.5 miles of the lower end of Dark Canyon from the confluence of Big Wall Creek has been fenced to exclude livestock from that portion of Dark Canyon Creek. The upper end of Dark Canyon Creek has limited access due to terrain and down wood. Grazed after July 15. DMA	Wildhorse Pasture
Lost Canyon Creek	Middle Big Wall	Yes	No	Approximately 1 mile of Lost Canyon Creek upstream from the confluence of Big Wall Creek has verified presence of MCR steelhead and spawning. Cattle access to the lower mile of stream on Lost Canyon Creek is limited due to terrain and downed wood. Grazed after July 15. DMA	Wildhorse Pasture
Tamarack Creek	Upper Kahler	No	No	Tamarack Creek within the allotment boundary is a snowmelt stream, and is intermittent with isolated pools by early to mid-May. There is no DCH and no documented spawning within the allotment boundary. There is a barrier culvert at Highway 207. Approximately .8 miles of Tamarack Creek from the allotment boundary has verified presence of redband. DMA	Stalling Butte Pasture

Environmental Effects

This section analyzes the direct and indirect effects of the proposed project on listed and non-listed native aquatic species and DCH. Direct effects are immediate impacts, both adverse and beneficial, from project-related actions. Indirect effects are caused by, or result from a proposed action and may occur later in time.

Range activities on the Tamarack Allotment are closely managed (fencing, 14 upland water developments, pasture rotation, salting and riding); thereby reducing the potential for impacts to ESA listed fish and their critical habitats. This is due primarily but, not exclusively to, Best Management Practices (BMPs) and project-specific design criteria applied uniformly across the project area, together with proposed conservation measures.

Based upon field reviews of the allotment and past studies (Spence et al. 1996 and Platts 1991), the primary potential impacts on the Tamarack Creek Allotment would be grazing near or on stream banks and removing and/or trampling associated vegetation along stream reaches that are not excluded from cattle use, and possibly chemical contaminants due to livestock waste. Restricting cattle access to streams until after July 15th in some reaches and fencing others will limit direct effects

to fish and prevent trampling of redds. Given the narrow wetted width of the majority of these stream channels the percent side channel habitat is minimal in most of the stream reaches.

Alternative 1

Direct and Indirect Effects

Under Alternative 1, grazing would not be authorized. Improvements such as fences, gates, and pipelines would be removed unless identified as important for other resources needs such as wildlife. No grazing would eliminate all potential direct and indirect effects of livestock on stream habitat and water quality parameters in this allotment. There would be potential beneficial direct/indirect effects to ESA listed fish species, designated critical habitat (DCH) and USFS R6 sensitive fish and aquatic invertebrates. However, elk and deer would have more unrestricted access to streams and could increase grazing in areas currently fenced off from cattle, including areas of spawning steelhead.

The rate and magnitude of change in stream and riparian habitat condition due to no cattle grazing would vary depending on the streams current floodplain connectivity, substrate composition, stream flow, riparian vegetation composition, upstream sediment supply, and climate (USFS 2015). See hydrology report for additional effects analysis to physical habitat indicators.

Temperature

Under the No Grazing Alternative approximately 5.7 miles of fish bearing streams will no longer be grazed by livestock. No grazing could result in a decrease in water temperature by increasing streamside vegetation that provides shade and by altering the shape of stream channels which decreases the surface area of a stream. Water temperature is partially a function of the amount of solar radiation reaching a stream channel and the amount of surface area. The quantity and vigor of plants that shade streams and influence water temperatures would improve due to the lack of browsing by livestock.

Sediment

No grazing may decrease the supply of fine sediment available for transport to streams. This may occur where 1) the recovery of compacted soils and the revegetation of bare areas is a result of no grazing; and 2) an increase in bank stability through the lack of mechanical damage to stream banks or increase in rooting strength of streambank stabilizing vegetation. Both of these may result in reduced erosion rates resulting in a reduction of fine sediment levels in streams.

See hydrology report for a complete discussion of effects of sediment and other physical characteristics under Alternative 1.

Chemical Contamination/Nutrients

Under the No Grazing Alternative, nutrient loading or chemical contamination entering the streams within the project area would remain unchanged or lower slightly. See hydrology report for a complete discussion of effects of chemical contaminants and nutrients under Alternative 1.

Disturbance from Grazing

Under the no grazing Alternative there would be no probability of disturbance to aquatic species from cattle grazing or any other activity associated with allotment management. There would be a very low probability of disturbance from removal of fences and other infrastructure.

Cumulative Effects

As described in the hydrology report, past activities and events in the planning area watersheds include timber harvest: other grazing allotments, elk, road construction, closures, improvements and decommissioning; wildfire and prescribed fire as well as recreational use including trails. The No

Grazing would have potentially beneficial direct and indirect effects on fisheries in the project area. However, none of these other past, present, or reasonably foreseeable activities in the project area would have effects that, when added to the activity from this project, would ultimately create significant beneficial or negative effects to fisheries in the project area. Cumulative effects to physical parameters are described in the hydrology report.

Alternative 2

Direct and Indirect Effects

Alternative 2 would continue grazing with no added spring sources, or additional fencing. Alternative 2 is described in detail in Chapter 2, including reauthorizing grazing (209 cow/calf pairs from 5/1 - 9/15). Activities associated with cattle that could impact water quality and riparian areas include grazing, fence maintenance, including use of motorized equipment for maintenance of water sources. The type and magnitude of the direct and indirect effects is not expected to change as this alternative reflects current management.

Temperature

See hydrology report for complete discussion of effects to temperature. Water sources and salting methods in uplands help keep cattle away from streams and minimize impacts. Based on monitoring as described in the hydrology report, any reduction of shade beyond existing riparian vegetation is expected to be minor and insignificant.

Sediment

Livestock grazing can increase fine sediment levels in streams by increasing the supply of fine sediment available for transport. This can occur where 1) livestock grazing results in compacted soils and bare areas from overgrazing; and 2) livestock grazing results in decreased bank stability through mechanical damage to stream banks or reductions in rooting strength of streambank stabilizing vegetation. Both of these can result in an increase in erosion rates resulting in increases in fine sediment levels in streams.

Streams grazed after the July 15th restriction date are small, most are dry or intermittent with little flow to transport sediment. Riparian vegetation performs a number of vital functions that affect the quality of fish habitat. Vegetation increases allow roots to stabilize streambanks and stems and foliage to slow water velocities, trap fine sediments, provide over-cover for fish, provide shade that may aid in keeping stream temperature cool, and provides additional terrestrial invertebrate input important to fish diet during the summer months (Murphy and Meehan 1991, Saunders and Fausch 2010).

Umatilla NF LRMP has established maximum end of the season utilization standards for both riparian and upland vegetation conditions. Stubble height and woody browse at Designated Monitoring Areas have consistently met end of season utilization standards on the allotment since 1998. Monitoring of streambank conditions conducted since 1993 and more current PIBO EM data (PIBO data analysis) demonstrate streambank stability has primarily been above 90 percent bank stability. Grazed riparian areas continue to meet grazing standards during post-grazing monitoring. Given this there would be low probability due to maintained functioning condition of riparian vegetation that sediment will be transported downstream.

Where livestock are allowed to graze along Class I and intermittent streams, use would be monitored to assure conditions are maintained at required use levels. Past monitoring demonstrates that cattle can graze these areas under current management protocols, and meet other resource objectives. See hydrology report for a complete discussion of effects of sediment and other physical characteristics and monitoring results.

Chemical Contamination/Nutrients

Nutrient loading or chemical contamination entering the streams within the project area would remain unchanged. See hydrology report for a complete discussion of effects of chemical contaminants and nutrients under Alternative 1.

Disturbance to Aquatic Species from Grazing

There are approximately 5.7 stream miles that are fish bearing and accessible to cattle on Tamarack Allotment. There are 1.3 of 3.7 miles of South Fork Big Wall Creek and 3.25 of 3.75 miles of Dark Canyon Creek that are fish bearing and accessible to cattle. Spawning begins in these streams in mid-April to mid-May.

Grazing authorization occurs only after steelhead fry have emerged from redds. Direct impacts under this alternative would have some impacts to steelhead and resident fish fry when occupied fish areas overlap with cattle grazing. During summer months and low flow periods, approximately 62 upland water developments, fencing, terrain and riding and salting help keep cattle away from streams minimizing impacts to juvenile ESA listed and native fish populations. (Table 3-16) In 2013, National Marine Fisheries Service concurred that effects to listed steelhead and their Designated Critical Habitat from ongoing grazing based on the management actions described for this alternative, would be small and immeasurable, validating Forest Service conclusions here for both redband and steelhead and for their habitats.

Cumulative Effects

Under Alternative 2, there would be no change to current management and therefore, there would be no change in effects on aquatic species. Alternative 2, there would be no change to current management and therefore, there would be no change in effects on aquatic species As described in the hydrology report, past activities and events in the planning area watersheds include timber harvesting; livestock management on other grazing allotments, elk activity; road construction, closures, improvements and decommissioning; wildfire and prescribed fire; as well as recreational use, including trails.

Wild ungulates would continue consuming upland and riparian vegetation; and walking through stream channels within the Tamarack allotment and as well as other allotments within the watershed. The impacts of elk currently numbering above historic levels would continue. Other cumulative effects described in the hydrology report, such as implementation of the Kahler project, which is ongoing, could have a negligible change to physical parameters potentially affecting aquatic resources. Because no measurable changes to habitat parameters directly attributable to livestock grazing, any cumulative effects to fish and other aquatic species from current grazing management to water quality, bank stability and other habitat parameters discussed, when added to existing conditions and ongoing projects such as Kahler project, would be at a very small level and not measureable as livestock management under this alternative is designed to allow for habitat restoration to continue through natural processes, at near-natural rates and is not expected to accelerate habitat restoration by means of natural processes.

The statement in the cumulative effects portion of the hydrology section does not suggest that the action alternatives proposed would have no effect to water quality, stream flows or sediment regimes that would affect sensitive or listed fish or sensitive aquatic invertebrates. These statements identify that the action alternatives combined with past, present and reasonably foreseeable effects at the watershed within the Tamarack Allotment would be small and difficult to measure. Livestock management (timing of grazing, intensity of grazing and duration of grazing while cattle are grazing on the allotment) along with existing upland water developments and proposed water developments, riparian fencing, mineral placement, and herding of livestock are deigned to distribute livestock

grazing effects away from sensitive riparian areas where there are listed and or sensitive fish species and Designated Critical habitat (DCH).

Alternative 3

Direct and Indirect Effects

Alternative 3 would allow the current management of the allotment which authorizes 209 cow/calf pairs from June 1st through September 15th with modifications. The modifications would increase the number of upland spring developments and include additional riparian fencing to Dark and Lost Canyon Creeks within the Wildhorse pasture.

Proposed actions under Alternative 3 have similar direct/indirect effects to ESA listed fish species, designated critical habitat and USFS Region 6 sensitive fish and aquatic invertebrates as analyzed under Alternative 2. Additional fencing would protect aquatic resources along Dark Canyon and Lost Canyon Creeks. Construction of fence line may have localized (a few square feet at each post hole) disturbance during construction. Replacement of fence line and upland spring development may have indirect beneficial effects to fisheries by further deterring cattle movement and transport through riparian areas.

See hydrology report for additional discussion of effects to physical parameters from fence construction and water developments.

Disturbance to Aquatic Species from Grazing

Effects to aquatic species would be similar to Alternative 2, although overall effects would be reduced because additional fencing would protect additional stream channels. Fence construction disturbance to aquatic species would be insignificant.

Cumulative Effects

Effects to aquatic species would be similar to Alternative 2, current management. As described in the hydrology report, past activities and events in the planning area watersheds include timber harvest: other grazing allotments, elk, road construction, closures, improvements and decommissioning; wildfire and prescribed fire as well as recreational use including trails.

Wild ungulates would continue consuming upland and riparian vegetation; and walking through stream channels within the Tamarack allotment and as well as other allotments within the watershed. The impacts of elk currently numbering above historic levels would continue. More stream segments would be protected because of additional fencing, and potential reduce impacts of wild ungulates. Other cumulative effects described in the hydrology report, such as implementation of the Kahler project, could have a negligible change to physical parameters potentially affecting aquatic resources. Any effect to fish and other aquatic species would be at a very small level and not measureable.

Effects to Management Indicator Species

Interior Redband Trout

Alternative 1

As described previously in response to the elimination of livestock grazing, it is expected that certain riparian shrubs (i.e. young plants) would respond favorably. Considering this and the fact that the effects of the past, present, and reasonably foreseeable activities in the project area, when added to the effects of Alternative 1, would not have any consequential negative effects, there is the possibility that the riparian vegetation and stream habitat response to the No Grazing Alternative would be too

small to measure. Therefore, there would be negligible and discountable effects to Interior Redband Trout. Viability of this species will be maintained across the forest.

Alternatives 2 and 3

The overall direct, indirect and cumulative effects from Alternatives 2 and 3 would be ***negligible and discountable*** to Redband Trout. A negligible and discountable effect may occur in the project area and is expected to be too small to measure and insignificant at the Forest scale. Viability of this species will be maintained.

Biological Evaluation and Determination of Effects

Middle Columbia Steelhead and Designated Critical Habitat

Alternative 1

Under this alternative, direct, indirect and cumulative impacts to this species and its habitat from authorized livestock grazing in the Tamarack Allotment would be eliminated. In response to the elimination of livestock grazing, it is expected that certain riparian shrubs (i.e. young plants) would respond favorably. However, it is important to note that with current grazing management, the UNF is meeting stubble height and utilization standards. Light utilization standards (3 to 22 percent) have been consistently met. Considering this and the fact that the effects of the past, present, and reasonably foreseeable activities in the project area, when added to the effects of Alternative 1, would not have any consequential negative effects, it is possible that the riparian vegetation and stream habitat response to the No Grazing Alternative would be too small to measure. Effects would be from removal of fences and increased access by wild ungulates to streams. Therefore, effects would not be measureable to Threatened MCR steelhead and DCH. Fence removal may require ESA Section 7 consultation with the NMFS.

Alternatives 2 and 3

Implementation of the Tamarack Allotment under Alternative 1 **may effect, but are not likely to adversely affect** Middle Columbia steelhead, or designated critical habitat. The overall direct, indirect effects of any of this project's action alternatives would result in negligible and discountable effects to MCR steelhead and their DCH at the project scale and thus at the forest scale. The project is consistent with the Forest Plan as amended by PACFISH; the project activity will not further affect viability of the NFJD River MCR steelhead population on the Umatilla National Forest. The Biological Assessment completed in 2013, and the subsequent Letter of Concurrence dated December 23, 2013 (reference WCR-2013-138) is consistent with Alternatives 2 and 3. This includes "Adaptive management using a combination of fencing riparian areas, upland water development…ensure there are no adverse effects to MCR steelhead and their DCH" (LOC p. 3). Under Alternative 3, fence construction is an authorized category in the ESA programmatic 2013 Aquatic Restoration Biological Opinion, and dependent on fence location, ESA Section 7 consultation could occur through this programmatic as needed.

Sensitive Species

Alternative 1

Effects to Sensitive fish species such as Pacific lamprey, and Sensitive aquatic invertebrates such as Western ridged mussel, Shortface lanx, and Columbia clubtail and their habitats would not be measureable under the No Grazing Alternative. There may be impacts to individuals, but viability of these species would be maintained across the forest.

Alternatives 2 and 3

The overall direct and indirect effects from Alternatives 2 and 3 may impact individuals or habitat but is not likely to result in a trend toward federal listing, and continued viability is expected on the Umatilla NF. A negligible and discountable effect may occur in the project area but, are expected to be immeasurable and insignificant at the Forest scale.

Summary of Environmental Effects

Alternative 1

Alternative 1 (No Grazing) would do the most to reduce cattle impacts to water quality within the Tamarack allotment but does not meet the Purpose and Need of the project.

Alternatives 2 and 3

Alternative 3 provides more protection of riparian areas by fencing and development of upland water sources than Alternative 2. As described earlier, and due to fencing and topographic features displayed in Table 3-16, there are no direct effects to ESA listed spawning steelhead and their redds. There may be effects after July 15, but effects to all aquatic species are minimal due to upland water sources and fencing on many miles of perennial streams. In Alternative 1 (No Grazing) would do the most to reduce cattle impacts to water quality within the Tamarack allotment but does not meet the Purpose and Need of the project. Alternative 3 provides more protection of riparian areas by fencing and placing upland water sources than Alternative 2 which reflects current management.

Consistency Finding

The listed alternatives would be consistent with Forest Plan direction regarding native fish populations. None of the potential effects of allotment management under any of these alternatives would be expected to retard progress towards PACFISH Riparian Management Objectives or reduce steelhead/redband trout population viability.

3.5 SOILS

Methodology

Soil order (soil development), soil productivity, potential erosion risk, and soil temperature were used to analyze the effects of each alternative to soils. The spatial boundary for analysis of the effects to soils is the Tamarack Allotment. The TEUI (Terrestrial Ecosystem Unit Inventory) was mapped within the allotment. The mapping is broken into Map Units (MU). Each of these MUs may contain up to four individual soils series.

Affected Environment

Soil Order (Soil Development)

Based on the TEUI (Terrestrial Ecosystem Unit Inventory) and map units (MU), the taxonomic development of these soils were mostly developed under grassland site conditions. Mollisol soils are classified by a high base cation content (plant available soil nutrient levels), not typically found in forested environments. There is also some Andisol mapped in the area. Andisols are developed from volcanic deposition in this area of the Umatilla NF, this deposition is from air fall. Andisols are commonly considered to have a high plant availability of soil moisture.

Soil Productivity

As described above, both the Andic soils and Mollisols were mapped within the Tamarack Allotment and both soils can have elevated productivity, but for differing reasons. Mollisols offer more nutrient availability, from their elevated cation exchange capacity (CEC). Andisols are noted for having

elevated moisture retention, mostly due to a loamy soil structure of the mineral components (ash). This soil structure helps infiltration of moisture and the vesicle nature of volcanic glass increases the plant available moisture retained with capillary action. It is this soil/water retention in Andisols providing moisture to allow root pressure (Stocking 1956), to overcome capillary action of the soil. In Mollisols root pressure may not have the ability to overcome capillary action in clay soils, so later in the season they can be droughty to some plants.

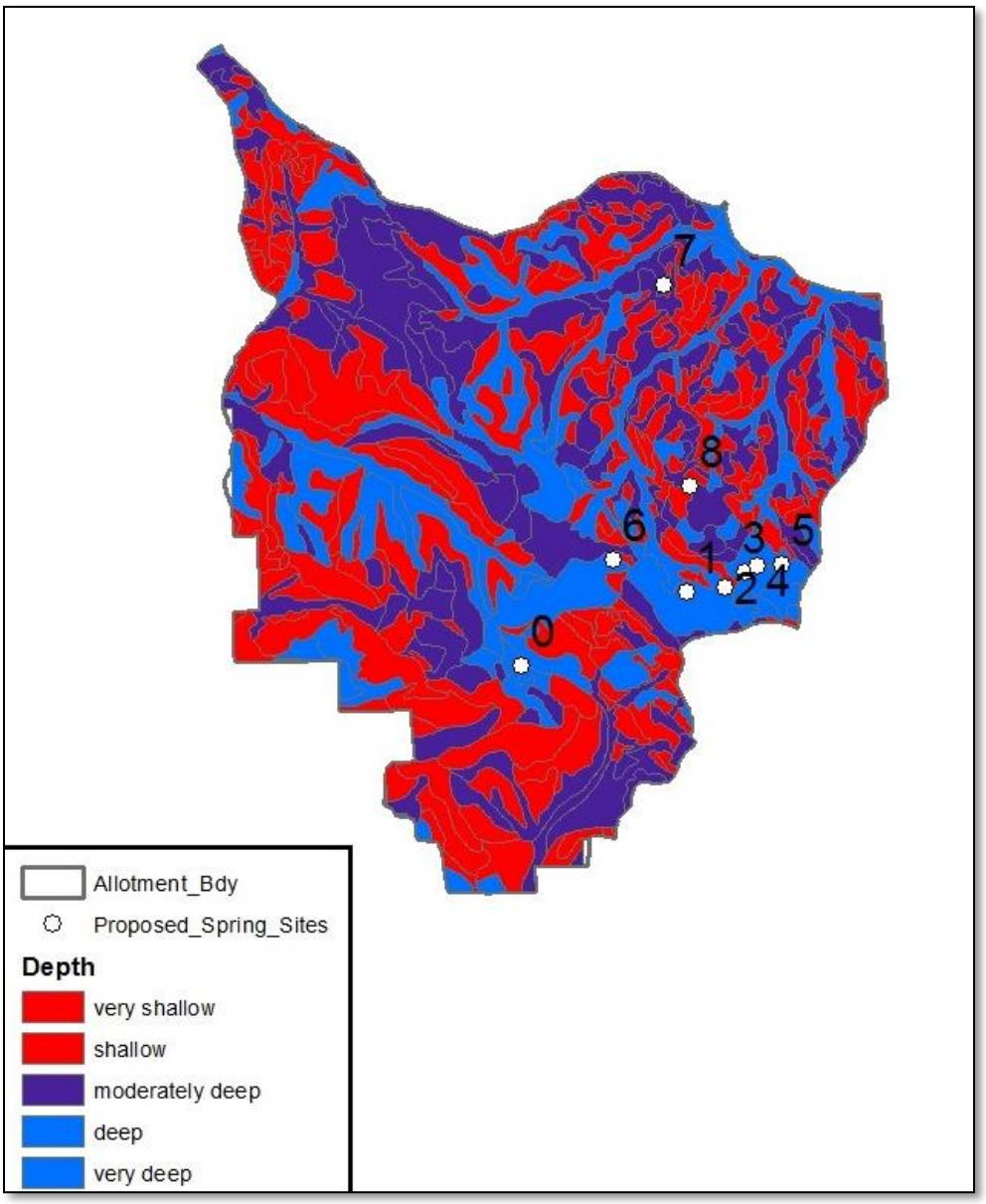
The same capillary action of soils and root pressure of plants occur within Mollisols, but many Mollisols hold moisture within root restricting clays or the narrow space between clay particles. Water within these narrow spaces is prevented from being released by the clay dominated capillary fringe. Therefore Mollisols may have greater volumes of nutrients than the Andisols, in some cases more moisture. But without the catalyst of nutrient transfer (available moisture); these nutrients effectively remain out of reach to plants.

Potential Erosion Risk

Of the things that can influence erosion in most range settings; is loss of effective ground cover (EGC), soil compaction from animal traffic or riparian (stream) degradation. When reduced infiltration occurs, the nutrient laden portion of the soil can be at risk; displaced by the collection of surface water forming sheet erosion. It would occur near water sources and along fence lines where animal congregation occurs.

Where soil depth is shallow and EGC does not minimize rain splash displacement and entrainment of the soil (erosion), the risk of erosion should be considered high. Reason being is a shallow soil with chronic losses from erosion will reduce site productivity and enter into a trend of productivity losses until the area is put into rest. Depending upon the level of loss, the rest period may be many years. The potential erosion risk is based on soil depth. The current soil depths within the Tamarack Allotment are illustrated below (see Figure 3-8).

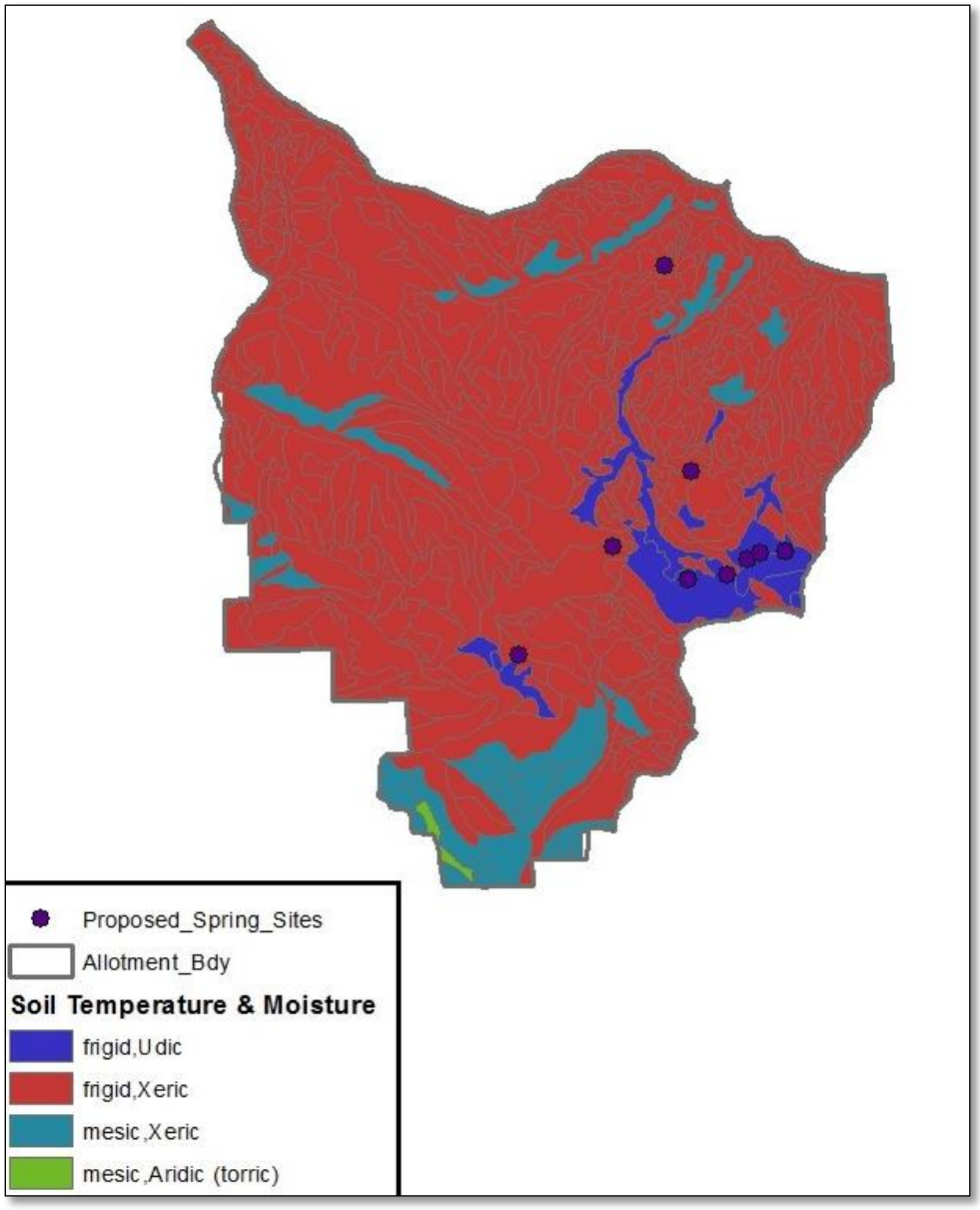
Figure 3-8: Mapped Soil Depths within the Tamarack Allotment



Soil Temperature and Moisture Regimes

Other information related to the TEUI soil mapping are soil temperature and moisture ranges (Figure 3-9). Andic soils are located with a frigid soil temperature and an udic (sufficient moisture) condition. Soil classified as udic are defined as including a condition which allows for sufficiently high year round moisture (in most years) to meet plant needs (Brady and Weil, 1999). Given the seep condition (surface water) maybe an indication of a minor mapping unit with perudic (excess moisture) conditions were not recognized in the TEUI; likely due to the small area in this condition. Field evaluation of perudic conditions was not made. The existing soil temperature and moisture are mapped below (Figure 3-9).

Figure 3-9: Soil Temperature and Moisture Regimes



Summary of Environmental Consequences

In all three alternatives, under which there would be no grazing (Alternative 1) or grazing from May 1 to September 15, all of the soils mapped within the allotment potentially have enough nutrient value for vegetation growth in pastures, primarily because the soil on most of the acres are Mollisols, meaning they have developed over time under grassland conditions and tend to be fertile soils. Soils in some of the mapped areas are Andisols. These are soils formed from volcanic material and they may also have elevated soil/moisture with the potential to make nutrients available to desirable forage. This is especially true where the ash layers from Andisol development overlay nutrient accumulations of Mollisol soils.

The proposed spring developments as described in Alternative 3, are a mixed result from a soils perspective. Five of the nine proposed spring sites are likely to be attainable (Springs 1, 2, 3, 4 and 5),

given that they have adequate soil depth, ash soils, and noted seeps. The remaining proposed spring sites may be more problematic. These sites do not have mention of water in the Terrestrial Ecological Unit Inventory (TEUI)[3] survey data. In fact, these locations in the TEUI data are noted as having xeric conditions (having long periods of drought in the summer). Lastly, it is possible the shallow soil of Spring Development 8 could be developed for use by animals, but the shallow soils of the site will have little resilience for grazing damage. Unless there is water present; any development (at sites 0, 6, 7, or 8) may have to rely on precipitation or water piped in from another source. This evaluation considers these developments as low-volume water sources with seasonal viability.

Provided the stipulated soil project design criteria (see Appendix A) are fully implemented the impact of all alternatives would likely create minimal or unmeasurable impacts to the soil resource. There is a low likelihood of beneficial effect to the soil. It is possible that the grazing would spur growth of grasses and herbs and that subsequent root development would add more soil organic matter to the resource; however, given the proposed utilization standards and the timing of grazing, any benefit from such an effect may not be measurable.

Because Alternatives 1, 2, and 3 would have little or no impact on soils, there would be no cumulative impact caused by the incremental addition of the effects of any of the alternatives to the effects of other past, present, or reasonably foreseeable activities in the project area.

3.6 Botanical Resources

Methodology

There are currently 66 species of Forest Service designated sensitive plants documented, or suspected, to occur on the Oregon portion of the Umatilla National Forest (USDA Forest Service, July 13, 2015). See Appendix A of the botany report located in the project record for a complete list of sensitive plant species for the Oregon portion of the Umatilla National Forest.

Rather than evaluate effects to so many species individually, this analysis focuses on how potential activities may impact habitats that may support sensitive plant populations. Species documented in the project area are addressed individually.

Spatial and Temporal Context for Effects Analysis

Direct and Indirect Effects Boundaries

The spatial context for this analysis is the project area. Since plants do not generally move over large areas quickly, and no downstream effects are anticipated, it is not necessary to analyze effects to sensitive plants outside of the planning area.

The temporal context for effects analysis includes short term and long term effects. Short-term effects are considered to be one to two years after project implementation. These would generally be from direct effects such as ground trampling or ingestion. Long term effects for this analysis are considered to be longer than two years. These effects would generally be from indirect effects such as changes in sunlight, erosion rates, hydrologic regimes, and changes in animal grazing patterns and intensity.

[3] The Terrestrial Ecological Unit Inventory (TEUI) is a system to classify ecosystem types and map ecological units at different spatial scales (U.S. Forest Service website, at https://www.fs.fed.us/soils/teui.shtml).

Cumulative Effects Boundaries

The spatial boundaries for analyzing the cumulative effects to botanical resources is the project area because plants do not move across the landscape to any significant extent. The temporal boundaries for analyzing the cumulative effects are from the time of colonization by Europeans to ten years into the future.

Basis of Effects Determinations

Federally listed, proposed and candidate species

There are no federally listed, proposed, or candidate plant species or potential habitat in the project area. Therefore, under any alternative, there will be no effect to federally listed, proposed or candidate plant species

Forest Service sensitive species

The four possible effect determinations for sensitive plants are outlined in Forest Service Manual 2670 and are referenced here. For more detail descriptions of these determinations, see Appendix A of the botany report and biological evaluation located in the project record.

- NI - No Impact
- BI - Beneficial Impact
- MIIH - May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species
- WIFV - Will impact individuals or habitat with a consequence that the action may contribute to a trend towards federal listing, or cause a loss of viability to the population or species

Affected Environment

Historic botanical surveys

A query of the USFS Natural Resources Manager database shows that much of the area has had some level of botanical survey since the early 1990s. The information in the database on these surveys often only includes a date and a mapped survey area. There is no information in the database on targeted species, or any information on habitat conditions. When most of these surveys were done, there were only vascular plants on the sensitive plant list. The current sensitive list now includes non-vascular plants and lichens, as well as several vascular plants that were not on the sensitive list at the time of the historic surveys. Listed below are the details of the historic surveys. Note, many of the survey areas overlapped, so the total acres shown here is cumulative.

Table 3-17: Historic Botanical Surveys in the Project Area

Tamarack Botany Surveys

Survey ID	Survey Name	Acres
061400S00264	Bologna Basin 93	10127.8173
061400S00291	Coffee Pot 92	16324.6237
061400S00549	Tamarack-Mahogany II 93	14898.2885
061400S00550	Tamarack-Mahogany P.A. 88	15341.8593
061400S00607	Wall Creek Fish Enhancement 91	253.599
061400S00623	Whitetail P.A. 91	7036.2744
061400S00681	Rimrock Carex Blitz 99	41703.3909
061400S00784	Little Tamarack Prescribed Burn 91	948.1617
061400S00792	Upper Wall TS 91	3613.7228
061400S00793	Upper Wall T.S. 91	3977.5061
061400S00796	Putnam Subsoil 91	61.0195
061400S00840	N.F.J.D. Roadbrushing 92	6482.8625
061400S00853	Upper Wall TS II (24e) 95	28.7135
061400S00869	Upper Wall TS II (24c) 95	4406.1228
061400S00920	Tamarack/Monument allotment 2002	16808.132
061400S01075	West End OHV ELBO Blitz 2007	3231.0157
061400S01116	Tamarack Mt. 2010	483.0903
061400S01135	Kahler 1 2012	2275.9417
061400S01171	Kahler surveys 2013	1018.7874
	Total Acres	149020.

Project-Specific Botanical Surveys

In the summers of 2015 and 2016, botanical surveys were conducted for this project. The focus of the surveys was to search for sensitive vascular plant species. Special emphasis was to search for sensitive species that have been historically documented nearby. Two populations of the Clearwater cryptantha were found during the surveys of 2016. All proposed spring developments were surveyed during the 2016 surveys. No sensitive plant populations were found in any of the proposed spring development areas. A comprehensive list of vascular species encountered was recorded. This is available in the project files. See Table 3-18 below for details of the dates and names of surveyors.

Table 3-18: Project-specific botanical surveys

Date	Surveyor(s)
05/19/2015	Allen and Frazee
06/16/2015	Allen and Robins
06/17/2015	Allen and Robins
06/18/2015	Allen and Robins
06/20-6/23/2016	Darrach

Date	Surveyor(s)
06/19/2015	Allen and Robins
06/30/2015	Allen
07/01/2015	Allen
07/02/2015	Allen

Federally listed, proposed, and candidate plant populations and habitat

The Fish and wildlife Service website and the Forest Service NRM databases were queried to determine which plants of concern under the Federal ESA may be present in the project area (query conducted on June 14, 2016). The only species listed on the FWS website is whitebark pine, a federal candidate, which occurs in Grant County. However, this species only grows at elevations much higher than what is present in the project area. Therefore, there is no habitat for this species in the project area.

Sensitive plant populations in the project area

Clearwater cryptantha (*Cryptantha grandiflora*) is the only documented Forest Service sensitive plant species in the project area. This species was added to the sensitive plant list in 2015. This species was first identified in 1909. Later, it was considered to be a variety of common cryptantha (*Cryptantha intermedia),* a common and widespread species. Recent information indicates that it is actually a distinct species. Since this species was only recently identified as different from the common species, it was not on any rare list in the past. Botanists on the Umatilla National Forest have been looking for this species for only a few years. There have not been any surveys for (or documented populations) this species on the Malheur or Wallowa- Whitman National Forests (personal communication with Wallowa-Whitman and Malheur NF botanists). The historic collections of this species are in the Clearwater River, Idaho area, and around Clarkston, Washington. It was recently collected on the Pomeroy RD of the Umatilla NF (M. Darrach, 2016). The range of the species is not currently well defined.

Clearwater cryptantha grows on dry, rocky slopes. It has only been found on the Umatilla NF on a specific type of substrate, which is a Columbia River basalt variant that is lithologically a gabbro rather than a true basalt, so it is chemically actually quite different from most of the Columbia River basalts that dominate the Blue Mountains (M. Darrach, personal communication, 2016).

Two populations of this species were documented in the Wildhorse pasture in the Tamarack allotment in 2016. They occur on dry rocky slopes in the South Fork Wall Creek drainage. Some cattle trailing was noted in the populations, but no grazing or direct trampling were noted. Non-native annual grasses (cheatgrass and North Africa grass) were noted to be growing right in with the cryptantha. It is thought that the annual grasses are probably competing with the cryptantha for water. The population (element occurrence #0614021068) in T7S R26E Section 28 has 1400 plants scattered in three areas. The second population (element occurrence#0616021069) in T7S R26E Section 31 supports approximately 500 plants in a small scattered area.

Nearby populations of sensitive plants (within five miles of the edge of the allotment) include:

Pauper milkvetch (*Astragalus misellus* var. *misellus*) occurs about three miles southeast of the allotment (T8S R26E Sec. 35) on Forest Service land. This species grows on open sagebrush dominated slopes on sandy, often rocky soils. Associated species include big sage (*Artemisia tridentata*), low sage (*Artemisia arbuscula*), stiff sage (*Artemisia rigida*), Thurber's needlegrass (*Achnatherum thurberiana*), and Sandberg's bluegrass (*Poa secunda*). This species only occurs in central and northeastern Oregon. Documented populations are in Deschutes, Grant, Harney, and Jefferson Counties. The population near the Tamarack allotment is the only one documented on the Umatilla National Forest. Since this species was added to the Regional Forester's sensitive list in 2015 systematic surveys have not been done throughout the Blue Mountain forests. It is possible that there are undiscovered populations of this species both in the Tamarack allotment planning area, and other areas of the Blue Mountains.

Bolander's spikerush (*Eleocharis bolanderi*) is documented about five miles to northeast of allotment (T07S R27E Sec. 7, SW1/4) on Forest Service land. This site burned in the Sunflower flat fire of 2014. It has not been revisited to assess how the plants reacted to the fire. Plants of this species that burned in the Grizzly Bear fire on the Walla Walla Ranger District in 2015 do not appear to be negatively affected by that fire (P. Brooks, personal observations, 2016). Bolander's spike rush grows in vernally wet swales, along intermittent streams, and in wet depressions in moist meadows and lithosols. It is found in slight depressions that hold snow later in the season than surrounding areas. Surrounding forest is usually ponderosa pine. The range of this species includes Cascade and Blue Mountains of Oregon, south to California, east to southeastern Idaho and Utah. It is known from several scattered locations on all three Blue Mountain Forests.

Dwarf evening-primrose (*Eremothera pygmaea*) is a small annual plant in the evening primrose family. This species relies on early spring moisture to flower and fruit in spring. The plant makes seeds and dies by late June. Dwarf evening primrose grows on dry, open bare ground on plains and slopes with unstable soils or in gravel in steep talus, dry washes, banks, and road cuts.

Although it is usually associated only with rock and bare ground, it sometimes is found with big sage (*Artemisia tridentata*) or bitterbrush (*Purshia tridentata*).

The range of this species includes central Washington, south through central Oregon, south and east to and southwestern Idaho, northern California, and northern Nevada. In Oregon, it occurs in Grant, Harney Wasco, and Wheeler Counties. There are historic records near both the Malheur and Umatilla National Forests. There is probably potential habitat for this species in the project area. This species is reported to be about five miles to the southwest of the allotment (T9S R25E Sec. 10). This site is on private or BLM land. This is an old record (1993, by Karl Urban). No specific population or habitat data are available.

Arrow-leaf thelypody (*Thelypodium eucosmum*) is reported from one population on Umatilla National Forest land about two miles southeast of the allotment (T08S R26E Secs. 27 and 34). Several hundred plants were reported in 1993. No more recent information is in the database. Several other populations are documented to the south and west on private and BLM lands.

Arrow-leaf thelypody grows under and around western juniper, ponderosa pine, and Douglas fir trees. In grows in canyons, along seasonal creek drainages, and in and around seeps and springs. It is also found in vernally moist areas in ponderosa pine forests and in sage. It is restricted to serpentine and ultramafic soils on Malheur NF. The population near the allotment is the only known population on the Umatilla National Forest.

Sensitive plant habitat in the project area

The wide-ranging elevation and precipitation zones of the Umatilla National Forest support a wide diversity of plant species and communities. This diversity includes wet to dry grasslands, sagebrush dominated steppe, wet meadows and diverse riparian areas. Trees adapted to various moisture and temperature regimes define the various forest habitat types. Virtually every habitat may potentially support one or more Forest Service sensitive plant species. Presented below is a general discussion of these habitats is. It is not practical to try to quantify how many acres of each habitat type are in the project area. Each sensitive plant species has been assigned to one or more of these habitat types. See Appendix A of the Biological Resources Report for Sensitive Plant Occurrence and Effects calls for the list of sensitive species with their associated habitats.

Upland habitats

Upland habitats include those areas that not classified as wetlands or riparian areas. Upland habitats occupy the vast majority of acreage, and in general, describe the overall context of the landscape. Only analysis groups thought to be present in the analysis area are included here.

Table 3-19: Upland habitat analysis groups

Upland habitat analysis group	General habitat description (Dominant and climax species in parentheses)	Most common plant association groups (PAGs)
Upland forests	**Moist Upland Forests -** Moist mixed conifer forests at moderate to high elevations. Dominant species include grand fir, subalpine fir, lodgepole pine, Douglas-fir, Engelmann spruce, Rocky Mountain maple, Pacific yew, big huckleberry, twin-flower, queens' cup bead-lily, and heartleaf arnica. **Dry Upland Forests -** Primarily fire-adapted conifer forests at low to moderate elevations; this is the most common type on the south half of the Forest. Dominant species include ponderosa pine, Douglas- fir, grand-fir, bitterbrush, and snowberry, pinegrass, and elk sedge.	cool wet UF cool moist UF warm moist UF warm dry UF hot dry UF
Juniper woodlands	Woodlands are exclusively characterized as areas where western juniper is the dominant climax species. These communities are found most extensively on the southern half of the Forest. Dominant species include western juniper, mountain mahogany, sagebrush, Idaho fescue, and blue bunch wheatgrass.	hot dry UW hot moist UW
Upland shrublands	Includes upland ecosystems with little or no tree cover; primarily sagebrush steppe and related habitats, but also includes many other less common shrub land systems. Dominant species include big sagebrush, mountain mahogany, bitterbrush, snowberry, shrubby cinquefoil, basin wild rye, Idaho fescue, blue bunch wheatgrass, and prairie junegrass.	cold moist US warm moist US hot moist US warm dry US
Lithosols (scablands)	Often referred to as scablands, lithosols are habitats with very shallow soils on poorly weathered bedrock. Lithosols are often found as small inclusions within a larger matrix of grassland, shrub lands, and woodlands. Dominant species include stiff sagebrush, low sagebrush, Lemmon's needlegrass, and Sandberg's bluegrass.	warm dry US
Grasslands and upland herblands	Grassland habitats are generally dominated by bunchgrasses; this group also includes dry meadows dominated by introduced perennial grasses or native forbs. Dominant species include Idaho fescue, blue bunch wheatgrass, needlegrasses, Great Basin wildrye, and Sandberg's bluegrass.	cool moist UH warm moist UH warm dry UH hot dry UH
Cliffs, rock outcrops, and talus	Cliffs and rock outcrops have vertical faces where very few plants are able to survive. Talus and scree are accumulated boulders, cobbles, and gravel at the base of cliffs or on steep slopes. Dominant species include ferns, mosses, lichens, and sparse low-growing shrubs and herbaceous species.	dry UH

UF = upland forest, UW = upland woodland, US = upland shrubland, UH = upland herbland

Riparian/aquatic habitats

Riparian and aquatic habitats are characterized by a substantial presence of water and/or soil moisture. Aquatic habitats have persistent flowing or standing water. Lakes, streams, marshes and their respective substrates are types of aquatic habitats. Riparian habitats are defined as the moist to wet transition zones between aquatic and upland systems.

Table 3-20: Riparian and aquatic habitat analysis groups

Riparian/aquatic habitat analysis Group	General habitat description (Dominant and climax species in parentheses)	Most common plant association groups (PAGs)
Riparian forests and shrub lands	This group includes all riparian areas dominated by woody vegetation. These are usually riverine areas along perennial and intermittent streams. **Warm Riparian Forests and Shrub lands-** This is the most common riparian habitat group on the Forest; it includes the vast majority of actively-managed riparian areas at low to moderate elevations, which have the potential to be dominated by woody vegetation (willows, alder, aspen, black cottonwood, hawthorn, red-osier dogwood, pacific yew, Rocky Mountain maple, grand fir, Douglas-fir, water birch, and currants).	warm high SM RF/RS warm moderate SM RF/RS warm low SM RF/RS hot moderate SM RF/RS hot low SM RF/RS
Aquatic habitats	This group includes habitats that are entirely within flowing or standing or water. This includes lakes, ponds, streams, marshes, and flarks (depressions or hollows within bogs). Dominant species include pondweed, milfoil, creeping spikerush, cattail, torrent sedge, and aquatic mosses.	high SM RH undescribed PAGs
Moist meadows and vernal swales	Moist meadows and vernal swales are saturated in the spring and early summer, but by late summer the water table has significantly fallen below the soil surface yet still retains enough moisture for wetland species to persist. Dominant species include Nebraska sedge, Baltic rush, meadow sedges and false hellebore).	warm moderate SM RH
Groundwater dependent ecosystems (GDEs)	Groundwater-Dependent Ecosystems (GDEs) are typically small, but well distributed on the Forest. They often exist as relatively small inclusions in most other habitat types or form larger complexes with other aquatic, alpine, and wet meadow habitats (many obligate and facultative wetland sedges, grasses, mosses, and shrubs). **Springs:** GDEs where groundwater emerges and flows into a channel and are often developed for off-site watering of livestock. **Seeps:** GDEs where groundwater emerges but does not produce perennial flow. These often do not produce enough water for effective off- site water developments. **Peatlands and Fens:** Peatlands are GDEs that accumulate partially decayed plant matter (peat) over hundreds to thousands of years. Peat (histic soil) is partially decayed plant material that accumulates under saturated conditions where there is little oxygen to facilitate decomposition. Fens are the primary type of peatlands on the Forest.	high SM RF high SM RS high SM RH
Wet meadows	Wet meadows are flooded or saturated throughout the growing season with the water table at or slightly below the soil surface. These areas are typically dominated by obligate wetland species and are characterized by wetland soil types. Often they are features of larger wetland, riparian, or GDE complexes (bladder sedge, aquatic sedge, tufted hairgrass, Holm's Rocky Mountain sedge). Marshes	cold high SM RH cool high SM RH warm high SM RH

Riparian/aquatic habitat analysis Group	General habitat description (Dominant and climax species in parentheses)	Most common plant association groups (PAGs)
Dry and degraded riparian meadows and floodplains	This group includes highly altered and degraded riparian habitats. These areas are characterized by low soil moisture due to lowered water tables and are often dominated by introduced exotic grass species (Kentucky bluegrass, meadow foxtail, orchardgrass) or encroaching conifers	cold low SM RF hot low SM RF warm low SM RS hot low SM RS warm low SM RH

SM = soil moisture, RF = riparian forest, RW = riparian woodland, RS = riparian shrubland, RH = riparian herbland

Environmental Consequences

This is a general discussion of potential impacts due to cattle grazing.

Effects to federally listed, proposed, and candidate plant species

There are no known populations or potential habitat for any federally listed, candidate, or proposed, plant species in the project planning area. Therefore, activities associated with any of the alternatives would have no effect to any federally listed, candidate, or proposed plant species.

Therefore, consultation with the USFWS is not necessary for this project. These species will not be further analyzed or discussed in this report.

Direct and indirect effects to documented sensitive plant populations

The only documented sensitive plant species in the allotment is the Clearwater cryptantha. Due to the small stature, early season growth and senescence, and prickly nature, it highly unlikely that cattle target this species as forage. However, some cattle trailing through the populations is occurring (M. Darrach, element occurrence report, 2016). This may lead to indirect effects from erosion, introduction of non-native invasive plants, and changes in water runoff regimes.

Direct and indirect effects to undiscovered sensitive species populations and habitat

Cattle grazing potentially leads to negative direct effects to sensitive plant species due to ingestion and trampling. Potential indirect effects include changes in shade, soil erosion, nutrient cycling, and water availability relationships. Another indirect effect of grazing is the inability of plants to form mature seed before the heads get eaten by cattle. The use of rotational grazing helps reduce the impacts from this seed predation, since each pasture is rested from grazing periodically.

The majority of habitat in the Tamarack project area consists of upland coniferous forest and juniper woodlands. This habitat experiences relatively low utilization and concentration by livestock. This is due to both low forage production and inaccessibility or steepness of terrain. There are however, some potential impacts to these areas due to grazing, as discussed above.

Non-forested upland habitats including grasslands, sagebrush dominated shrub lands, and lithosols. These areas experience moderate disturbance from livestock activity. The biggest concern for these areas is cattle facilitated introduction, increase, and spread of non-native invasive plants, especially annual grasses. These species often outcompete native species. The other potential negative impact from cattle in these areas comes from soil pedestalling, and erosion that may occur when cattle are in the areas while they are still wet in the spring, or if a big storm hits during the time while the cattle are in the area. Although measures are taken to ensure that cattle are not turned out while soils are wet in the spring, there is no practical way to prevent impacts when storms pass through after the animals are already in the area.

Riparian and wetland areas in the project area include perennial and intermittent streams, wetlands, and many groundwater-dependent ecosystems, which include springs and seeps. These wet habitats

experience the majority of utilization and disturbance from livestock activity. This disturbance is most evident as trampled out muddy areas with all vegetation virtually eliminated. Bank shearing, widening of channels, and stream down cutting have been well documented to be attributable to cattle grazing. To reduce these impacts, most of perennial streams, and many of the springs have been fenced to exclude cattle.

Alternative 1

Under the No Grazing Alternative, livestock grazing would not be authorized within the project area. Improvements such as fences, gates, and pipelines would generally be removed over time. However, if these improvements are identified as important for other resource needs (e.g., as a water source for wildlife), they could remain in place.

Direct and indirect effects to documented sensitive plant populations

Elimination of all cattle grazing would eliminate any potential negative impacts to Clearwater cryptantha from cattle trailing and other indirect effects. The No Grazing Alternative should therefore have an overall beneficial impact (BI) to populations of Clearwater cryptantha within the project area.

Direct and indirect effects to sensitive species habitat

If all cattle grazing were eliminated from the allotment, potential negative impacts to undiscovered populations of sensitive plants (and their associated habitats) from current and future cattle grazing would also be eliminated. Plants subject to direct impacts from grazing, trampling, and soil disturbance would increase, become more vigorous, and would become more stable over time. Species would have a greater chance to reproduce by seed since their seed heads would have a better chance of reaching maturity. Any plants that rely on bare soil for establishment may theoretically become less common in the area. However, wild ungulates would continue to create early seral conditions that species that rely on bare soil need for establishment and sustainability. Negative indirect effects (changes in light, water relationships, and erosion) to species and habitats would also be reduced over time. By eliminating livestock grazing, the quality of currently unprotected aspen, aquatic, wetland, and riparian habitats would be expected to increase due to recovered hydrological processes, reduced erosion, and maintenance of appropriate plant communities. All potential sensitive plant habitat would experience direct and indirect beneficial effects from the absence of livestock grazing. This change would be most dramatic in in riparian areas, wetlands, and aspen stands. Therefore, if the No Grazing Alternative were selected there would be a beneficial impact (BI) to all sensitive plant species and their respective habitats.

Cumulative effects

Because no management would occur, the Proposed Action would have no effects to add to ongoing or future actions that would contribute cumulative effects.

Summary of Effects

If Alternative 1, the No Grazing Alternative were selected, negative direct and indirect effects to sensitive plant species and their habitats would be reduced and eventually eliminated. Therefore the biological evaluation call for potential effects to all sensitive plant populations, and their potential habitat is Beneficial Impact over both the short and long term. Because no management would occur, there would be no effects to add to ongoing or future actions that would contribute cumulative effects. Therefore, there will be no cumulative effects to sensitive plants or their habitat from implementation Alternative 1.

Alternative 2

Alternative 2 would allow the current management of the allotment to continue. It does not propose any new activities. This alternative would continue to authorize 209 cow/calf pairs from May 1

through September 15, using a deferred rotation grazing system. In addition, 44 miles of existing fences (9.25 miles of which is to protect riparian areas), and 62 water developments will be maintained. See the environmental analysis for more details on this alternative.

Ongoing direct and indirect impacts due to grazing would continue under this alternative. See the general discussion of potential impacts due to cattle grazing section above for details of potential direct and indirect impacts to sensitive plant populations and habitats.

PDCs would reduce the risk of detrimental impacts, but would not entirely eliminate the possibility of impacts to habitat and undiscovered populations. None of the sensitive plant species that may occur in the project area are extremely rare on a global scale. Therefore, even if project activities may impact individual plants or habitat, implementation of the Proposed Action should not increase the need for Federal listing of any sensitive species.

Direct and indirect effects to documented sensitive plant populations

See the general discussion above on direct and indirect effected to documented sensitive plant species. Due to the risk of impacts from cattle trailing, the effects call for Clearwater cryptantha for this project is MIIH.

Direct and indirect effects to sensitive species habitat

Upland forests and woodlands

Although this habitat type comprises the majority of the project planning area, it has experienced proportionally lower utilization and concentration by livestock attributed to both low forage production and inaccessibility or steepness of terrain. Much of the upland forest habitat was not specifically surveyed for sensitive plant species, but since most sensitive plant species occur in specific microhabitats, the probability that sensitive plant species may occur in the project planning area in these upland forested habitats is relatively low. Therefore, the effects call for Alternative 2 for species found in upland forests and woodlands is "May Impact Individuals or Habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH)".

Cliffs, talus, and rock outcrops

Although alternative 2 would allow continued grazing, cliffs, talus, and rock outcrops see little disturbance from livestock activity. This is primarily due to the fact that these areas provide very low forage capacity and are generally difficult for cattle to access. In addition, they represent a small fraction of project planning area. No new actions are proposed in this habitat type within the project planning area. Therefore, there should be No Impact (NI) regarding direct and indirect effects on sensitive species habitat from Alternative 2 to cliff talus, and rock outcrops.

Lithosols

Shallow-soiled (Lithosol) areas may be natively impacted by compaction when grazed when wet, and are prone to invasion by non-native annual grasses. Therefore, the effect call for Alternative 2 for Lithosol habitats is "May Impact Individuals or Habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH)"

Upland shrublands and herblands

These habitats would continue to have active use by livestock. Therefore the effects call for Alternative 2 for upland shrubland/herbland habitats is "May Impact Individuals or Habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species in (MIIH)".

Riparian and groundwater-dependent areas

This habitat type is often the most heavily affected by livestock activity, as livestock tend to concentrate around water sources. See the discussion above for details of the potential direct and indirect impacts to riparian and groundwater dependent areas. Many of the perennial streams are currently fenced and generally protected from grazing. These particular areas should have No Impact from grazing, but all the unfenced areas are still subject to grazing impacts. Therefore, the overall call for riparian and groundwater dependent habitats is "May Impact Individuals or Habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species in (MIIH)".

Aspen and warm riparian shrubland communities

Aspen trees in the Blue Mountain area are generally in decline, and so is the habitat for those sensitive species that inhabit aspen communities. The Tamarack area has no documented aspen or other hardwood trees in the corporate GIS layers. Both the district range conservationist (Tim Collins) and the botanists who conducted the project-specific botany surveys (Mark Darrach, Sandra Robins, and Laurie Allen) all indicated (personal communication and botany survey records) that there is very little aspen in the allotment. Aspen stands that may be undocumented would be subject to grazing impacts. These areas provide abundant shade and forage, and are very attractive to cattle. Although there is no specific data in the corporate database, other riparian shrub lands are undoubtedly present in the area. Since there is such a small amount of this habitat, the potential effects to this habitat type are relatively small. Therefore, the call for aspen and warm riparian shrubland communities for Alternative 2 is May Impact Individuals or Habitat, but would not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH).

Cumulative effects

Past, present, and reasonably foreseeable activities relevant to cumulative effects

In the past, present, and reasonably foreseeable future, there have been, and will continue to be, projects and activities within the planning area that may cause impacts to sensitive plants and their habitats. Projects and activities that create ground disturbance, change vegetative composition, and change wild and domestic animal grazing patterns may potentially cause detrimental impacts to sensitive plant populations and habitats. These actions include road construction, timber harvest, fuel reduction treatments (landscape and pile burning, lopping and scattering of slash), fire suppression, recreation development, and livestock grazing. In addition, restoration efforts such as road decommissioning, and stream improvements may also potentially impact sensitive plant populations and habitat. It is likely that historical activities have destroyed populations, and altered habitats for sensitive plants. These historical effects are not quantifiable. See the associated EA for the complete list of activities that may contribute to cumulative effects.

Climate change effects may be considered as a component of cumulative impacts. Changes in climate influence vegetation, water, and disturbance frequencies, and these changes, in turn, influence one another. Attempts to quantify the degree of this change would be speculative.

The historical abundance and distribution of sensitive species on the Forest is not known. Past activities have likely affected their current abundance and distribution. Beginning in approximately 1990, botanical surveys and biological evaluations were conducted for Forest Service projects planned and implemented on the forest. Since 1990, protection and management of sensitive species and their habitats (in the form of PDCs, avoidance, or other mitigation) have been included in the design of all projects. This has, and will continue to, reduce the potential of cumulative effects to sensitive plant populations and habitats. Therefore, the cumulative effects that may occur from this

project are not at a high enough level to qualify as extenuating circumstances that would require the preparation of an Environmental Impact Statement.

Summary of Effects

Alternative 2 would continue the grazing and trampling pressure from livestock; Overall livestock utilization would remain very similar to the levels and intensity that it has in the past decade.

Improvements and changes to habitat would be extremely slow to occur, on the scale of several years to centuries in some cases. This is mainly guided by slow-to-recover hydrological processes and seral plant community development. There are no known populations or potential habitat for any federally listed, or proposed, plant species in the project planning area. Therefore, activities associated with Alternative 2 would have no effect to any federally listed, proposed, or candidate plant species. Due to the characteristics and habitat of the only sensitive plant in the project area (Clearwater cryptantha), continuation of grazing would have minimal impacts to the two populations in the area. Therefore, the call for the known populations of Clearwater cryptantha for this alternative is May Impact Individuals or Habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH). Since cattle will continue to graze most areas in the allotment, and it is not practical to survey 100 percent of the allotment, there is a possibility that there are unmitigated effects from the ongoing grazing to undiscovered populations of sensitive plants. For this reason, the call for all species for most habitats in the allotment is May Impact Individuals or Habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH). The only exception to this is that due to the inherent lack of forage and difficult access, the call for cliffs, talus, and rock outcrops is No Impact (NI).

Alternative 3

The Proposed Action would continue to authorize 209 cow/calf pairs from May 1 through September 15 using a deferred rotation grazing system on 19,441 acres, as discussed above. To improve the distribution of livestock, new upland water developments (spring developments) are proposed. These developments would protect the water sources from cattle grazing. Construction of additional riparian fencing in Dark and Lost Canyon Creeks is also proposed. See the environmental analysis for more details on this alternative.

Project design criteria and mitigation measures

Project design criteria (PDCs) to protect sensitive plant populations and unique habitats are described in Appendix A. No specific mitigations were developed for protection of sensitive plant populations or potential habitat. Many additional PDCs would indirectly benefit sensitive plant populations and potential habitat. They include several to help control the introduction and spread of invasive non-native plants. Soil and riparian PDCs would also reduce potential impacts to undiscovered populations and sensitive plant habitat.

Required monitoring

PDCs should provide some level of protection to sensitive plant populations and potential habitat in the project planning area. However, implementation monitoring is recommended for documented populations of sensitive plants, and for areas where ground disturbing activities are proposed. This would include site visits to areas during and after project implementation. This monitoring would help to ensure that PDCs are followed and that they are effective in preventing negative impacts to sensitive plant populations and habitat. It would also allow an opportunity to confirm that the assumptions used for development of the PDCs are correct.

Direct and Indirect effects to documented sensitive plant populations

See the general discussion above on direct and indirect effected to documented sensitive plant species. The proposed PDCs that salting shall not be authorized within one quarter mile of occupied

habitat should help to reduce the amount of cattle trailing in the immediate area of the Clearwater cryptantha populations. The PDC that prohibits fence construction in occupied habitat would also help to reduce the chances of negative impacts to Clearwater cryptantha. Additional PDCs that help reduce impacts from cattle and will help to protect the population and additional potential habitat for the species. However, it cannot be stated with certainty that there would be absolutely no potential for negative impacts due to grazing activities. Therefore, the call for Alternative 3 for the documented Clearwater cryptantha populations is May Impact Individuals or Habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH).

Direct and indirect effects to sensitive species habitat

In general, potential direct and indirect effects to sensitive plant habitat are very similar between Alternatives 2 and 3. See the discussions under general discussion on direct and indirect effects and the discussion of direct and indirect effects for Alternative 2 for details of the potential effects.

Alternative 3 will provide more protection to wetland and riparian habitats due to additional proposed fencing and spring protections. The implementation of these actions will help to protect any undiscovered plants within those exclosures, but ongoing impacts in unprotected areas will continue to occur. Potential impacts to plants in upland habitat are essentially the same as for Alternative 2. Due to the uncertainty of exact locations of sensitive plants in the project area, it must be assumed that there may be some unmitigated negative impacts to undiscovered sensitive plants in the project area.

The proposed spring fencing, and improvement of troughs should reduce trampling of areas with saturated soil and heavy grazing of riparian dependent vegetation in the proposed spring development areas. These changes would allow native vegetation and soil stability to recover.

This indirect effect of soil stability and improved hydrological processes during the first few growing seasons would promote the build-up of organic matter within the area over years to decades. This habitat type is associated with many of the Umatilla NF's sensitive plant species. During the riparian enhancement projects, there should be no direct effects to sensitive species or the groundwater dependent ecosystems habitat type. The proposed new spring developments were surveyed in 2016, with no sensitive species detected. Therefore, this alternative should have Beneficial Impact (BI) for riparian and groundwater-dependent areas where spring developments are proposed. There may still be ongoing impacts to unprotected riparian habitats.

Therefore, the effects calls for all sensitive species that may occur in the project area is May Impact Individuals or Habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH). Even though this is the same call as for Alternative 2, it is likely that the risk to plants in riparian and wetland areas is relatively a little less for Alternative 3 (due to the planned riparian protections).

Cumulative effects

Cumulative effects would be essentially the same as for Alternative 2. See that discussion above.

Summary of Effects

Alternative 3 would allow continued direct and indirect effects from livestock grazing. Overall livestock utilization would remain very similar to the current levels. Improvements and changes to habitat would be extremely slow to occur, on the scale of several years to centuries in some cases. This is mainly guided by slow-to-recover hydrological processes and seral plant community development in these habitats.

The new water developments and fences proposed for Alternative 3 would potentially lead to a reduction in livestock impacts in the immediate areas of the new developments, and their associated riparian areas. As noted above for Alternative 2, species that grow in cliffs, talus, and rock outcrops would have the lowest potential for negative impacts. Therefore, the effects call for species that occur only in these habitats is No Impact (NI). Due to the inability to completely control cattle use in most habitats, the effects calls for species found in all other habitats is May Impact Individuals or Habitat (MIIH).

Summary of Environmental Effects

The United States Forest Service biological evaluation (BE) process was completed by a journey-level botanist for this project. This process includes a pre-field review of existing information, botanical surveys to search for sensitive plants, and development of project design criteria to protect both known sensitive plant populations and potential sensitive plant habitat. Potential direct, indirect, and cumulative effects to federally listed, candidate, and proposed plant species were analyzed. Potential effects to USFS Region 6 designated sensitive plants and sensitive plant habitat in the project area were also analyzed.

Botany surveys for rare plants were conducted for this project. The only Forest Service sensitive plant species documented in the project planning area is Clearwater cryptantha. Due to the large size of the project planning area, not all areas of the allotment were surveyed. There is a possibility that there are additional undiscovered populations of sensitive plants within the project planning area.

There are no known populations or potential habitat for any federally listed, or proposed, plant species in the project planning area. Therefore, activities associated with any of the alternatives would have no effect to any federally listed, proposed, or candidate plant species. Therefore, consultation with the USFWS is not necessary for this project.

Cattle grazing has the potential to cause both direct and indirect negative impacts to sensitive plants. Causes of these negative impacts include ingestion, trampling, changes in light and water regimes, accelerated erosion, introduction and spread of non-native invasive plants, and alteration of riparian habitats. Alternative 1, the No Grazing Alternative would eliminate the direct impacts from grazing in the short term, and habitats would eventually recover from both direct and indirect impacts. Therefore, Alternative 1 would have a Beneficial Impact (BI) to all sensitive plant species and their habitats. Alternative 2, current management, will allow current levels of grazing (with many riparian areas already fenced and effectively protected from grazing). Since it is not practical to survey 100 percent of the allotment, there is a possibility that there are unmitigated effects from the ongoing grazing. For this reason, the call for all species for most habitats in the allotment is May Impact Individuals or Habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH). The only exception to this is that due to the inherent lack of forage and difficult access, the call for cliffs, talus, and rock outcrops is No Impact (NI). Alternative 3, the Proposed Action, is very similar to Alternative 2. It will provide additional protections to the spring development areas; those particular spots will see a beneficial impact. However, overall, the call for Alternative 3 is the same as for Alternative 2; May Impact Individuals or Habitat but will not likely contribute to a trend towards federal listing or cause a loss of viability to the population or species (MIIH) for most habitats, and No Impact for cliffs, talus and rock outcrop habitats. Table 3-21 compares the three alternatives based upon the potential effects to sensitive species habitat.

Table 3-21: Summary of effects determination for all alternatives by sensitive species habitat.

Habitat	Alternative 1	Alternative 2	Alternative 3
Upland forests and woodlands	BI	MIIH	MIIH
Cliffs, talus, rock outcrops	BI	NI	NI
Lithosols	BI	MIIH	MIIH
Upland shrubland/herbland	BI	MIIH	MIIH
Riparian and groundwater-dependent areas (includes aquatic, riparian and wetland habitats)	BI	MIIH	MIIH
Aspen/warm to hot riparian shrubland communities	BI	MIIH	MIIH

BI= Beneficial Impact, NI=No Impact, MIIH= May Impact Individuals or Habitat

3.7 Invasive Plants

Scale of Analysis

The analysis area for evaluating existing invasive plant populations is consistent with the Tamarack Allotment area. Invasive plant infestations used in the analysis are only those sites located within project area. This analysis will then focus on noxious weed species and the potential for spread for identified species to spread within the analysis area.

Methodology and Assumptions

Invasive plants, as defined by the Pacific Northwest Region Final Environmental Impact Statement for the Invasive Plant Program, 2005, are a non-native plant whose introduction does or is likely to cause economic or environmental harm or harm to human health. This analysis will focus on those species that are listed on the Oregon Department of Agriculture noxious weed list. Invasive species and noxious weeds will be used interchangeably in this report.

Invasive plants will be discussed based on inventoried weed sites as well as known weed species that occur in the analysis area that are not inventoried. Known noxious weed sites, soil disturbance, and the potential spread of invasive plants will be the foundation of the analysis. In rating the priority of noxious weeds for treatment and inventory, the Forest classification will be used. This analysis is tiered to a broader scale analysis (the Pacific Northwest Region Final Environmental Impact Statement for the Invasive Plant Program, 2005, hereby referred to as the R6 FEIS 2005).

Existing Condition

Table 3-22 shows noxious weeds of concern within the project area and their associated priority category. Categories are used to prioritize noxious weed species on the Forest list for treating and inventorying. These categories include: 1) potential invaders; 2) new invaders and/or new invaders/established; and 3) established[4].

[4] 1)"Potential Invaders" are noxious weed species that occur on lands adjacent to the Umatilla National Forest but which have not been documented on lands administered by the Forest; 2) "New Invaders" are noxious weed species that occur sporadically on the Umatilla National Forest and which may be controlled by early treatment. This category has been split into two subcategories due to changes in weed populations on the Forest: a) “New Invaders” are of limited distribution and can probably be eradicated if early treatment can be implemented. b) “New Invaders/Established are those species that are presently controllable but which are approaching “Established” and which are prioritized for early treatment; 3)"Established" species are widespread across the Forest in large populations and containment strategies are used to prevent their further spread.

Table 3-22: Noxious Weed Species and Priority

Species	Common Name	Priority
Centaurea diffusa	Diffuse knapweed	New Invader/ Established
Centaurea biebersteinii	Spotted knapweed	New Invader/Established
Hypericum perforatum	St. Johnswort	Established
Cirsium arvense	Canada thistle	Established
Cirsium vulgare	Bull thistle	Established
Cymoglossum officinale	Houndstongue	New Invader
Linaria dalatica	Dalmatian Toadflax	New Invader
Taeniatherum caput-medusae	Medusa-head	New Invader/Established

Table 3-23 summarizes the existing noxious weed sites within the analysis areas that are located on the Umatilla National Forest Land. For a more in depth description of each species identified in the table below see the invasive plants report.

Table 3-23: Current Invasive Plant Presence

Species Code	Common Name	Number of Sites	Avg. Plants/Acre	Acres
Centaurea diffusa	Diffuse Knapweed	57	10-30+	1073
Cymoglossum officinale	Houndstongue	2	20+	85
Linaria dalatica	Dalmatian Toadflax	1	100+	108
Hypericum perforatum	St. Johnswort	38	100+	1091
Taeniatherum caput-medusae	Medusa-head	7	1000+	100+

Current Grazing Management of the Tamarack Allotment

Livestock grazing can cause soil disturbance and/or affect plant communities that allow noxious weeds to become established and spread. The current management of livestock on the Tamarack Allotment is to limit the amount of soil displacement that is caused by livestock. Annual grazing plans (Annual Operating Instructions) limit the duration and intensity of livestock use to reduce soil disturbance and allow desirable plant communities to remain viable. Healthy plant communities are less susceptible to the establishment and spread of noxious weed species. Permittees are instructed annually during the spring meeting about washing vehicles before they enter the National Forest. The permittees are encouraged to watch for weeds on the National Forest and report weeds that are found. Prevention strategies in Appendix B of the invasive plants report apply to the grazing and related management of the area located on the Tamarack Allotment.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

Alternative 1 would not authorize livestock grazing within the Tamarack Allotment. If this alternative was chosen, there would be no environmental effects concerning invasive plants as a result of livestock grazing. This Alternative provides the lowest amount of risk to the spread of existing or new infestations within the project area.

Ponds, troughs, and corrals would be restored, removed, or abandoned from the allotment. Livestock would no longer concentrate at these areas; therefore, soil disturbance would be greatly reduced at these sites. The potential for noxious weed establishment or spread by other means would continue.

New noxious weed infestations would likely continue to be found along roads, trails, and dispersed camping areas.

Treatment efforts would continue to occur within the project area consistent with NEPA decisions regarding weed control. Low priority species would most likely continue to spread to some extent due to a lack of treatment efforts, while high priority infestations will likely be controlled through treatment efforts.

The No Grazing Alternative would eliminate grazing on approximately 19,441 acres. This alternative would reduce the risk of the establishment and spread of noxious weeds caused by cattle. Within this analysis area there are 91 inventoried sites. There are 60 high priority sites approximately 3,059 acres invasive plants. Livestock grazing would no longer be a concern within or adjacent to these 499 acres of invasive plants.

There are a total of 13 infestations that total approximately 499 acres within the 27,051 acre allotment (Table 3-23). Approximately 1.8 percent of the allotment area is infested with invasive plants. About 425 acres of the 499 acres of invasive plant infestations are located along roads and right of ways. The other 15 percent of the infestations are often found within managed timber stands and are generally low priority species such as mullein, bull thistle, and St. Johnswort.

Alternative 2 and 3

Direct and Indirect Effects

Livestock grazing can affect the ability of native plant communities to out-compete and prevent invasive species from becoming established and spreading. Livestock grazing can also be a vector for the dispersal of invasive plant seeds. The prevention standards and design criteria have been prescribed for each of the action alternatives to reduce the risk of the spread and establishment of invasive plants. See Appendix A for a list of applicable prevention standards and design criteria.

All action alternatives have prescribed utilization standards, relatively low stocking rates, and a deferred grazing system that is designed to reduce negative effects to plant community health. This in turn will reduce the risk of the establishment and spread of invasive species.

Areas where cattle are concentrated can result in soil disturbance that may lead to the establishment and spread of invasive plants. These areas include corrals, water developments, and fence lines are considered high risk areas for soil disturbance. There are no known weed sites within these improvements where disturbance is the highest from concentrating livestock.

Roadside infestations account for over 85 percent of the infestations within all action alternatives. The roadside infestations within the allotment are primarily knapweed species. Cattle can potentially control the spread of noxious weeds by grazing undesirable vegetation (noxious weeds) A study conducted by Colorado State University determined that grazing knapweed twice in the spring decreased seed set by 50 percent and reduced tumbling-offsite by 15 percent (K.G. Beck, 2008). As a result, grazing livestock on knapweed sites before seed set may reduce seed production. Cattle's grazing in all infestations of invasive plants after seed maturity poses a risk of spreading seeds (University of Idaho, 2006).

Cattle are hauled and driven onto National Forest Land each year around May 1st. There is a potential for cattle to bring invasive plant seeds onto the allotment during this time.

All action alternatives include the prevention standards described in the Pacific Northwest Region Final Environmental Impact Statement for the Invasive Plant Program signed in 2005. All alternatives have been designed to be consistent with the Umatilla Land and Resource Management Plan as amended by the R6 FEIS 2005 Record of Decision for Invasive Plants.

Cumulative Effects

Roads are the highest risk area for invasive plants within the project area. Over half of the existing infestations are found along roads. Maintenance of road systems within the project area will continue to occur. Cattle grazing primarily occurs away from roads. The management and movement of livestock often occurs on roads and trails within the analysis area. There is a potential for cumulative effects with road maintenance and cattle grazing to cause the establishment and spread of invasive plants.

Recreational use within the allotment will continue to be a vector for the establishment and spread of invasive plants. High risk areas include the trail heads, roads, and dispersed camps.

Harvest and fuels reduction activities will continue to occur within the allotment area. Prevention standards will be required during these activities, reducing the risk of invasive plant infestations. Harvest and fuel reduction activities create transitory rangeland that cattle use.

Prescribed burning and wildfires will continue to occur within the allotment. Adjustments to the grazing schedules can occur within burned areas until such time as conditions have improved to a level suitable to allow grazing again. As a result, the cumulative effects of burning and cattle grazing will be minimal.

3.8 HERITAGE RESOURCES

Regulatory Framework

The following laws apply to the Tamarack Allotment Project: National Environmental Policy Act, National Historic Preservation Act (NHPA), the Archaeological and Historic Preservation Act, the Archaeological Resources Protection Act, the American Indian Religious Freedom Act. The Federal action referred to as an undertaking within the NHPA is general livestock grazing as authorized by Federal permit. Section 106 of the NHPA requires federal agencies to take into account the effect of a project on any district, site, building, structure, or object that is included in, or eligible for inclusion in the National Register. Additional policy direction relating to heritage resources is provided in the Umatilla National Forest Land and Resource Management Plan (LRMP) and the Forest Service Manual. Further direction has also been provided in the Regional Forester policy letter of May 19, 2006, "*Grazing Permit Reauthorization and National Historic Preservation Act*" which outlines the Grazing Allotment review strategy for Section 106 compliance (additional details provided in the existing conditions section).

In the 2004 PA with the Oregon SHPO, a streamlined compliance process with the NHPA is outlined. It targets numerous undertaking with limited potential to negatively affect cultural resources. The majority of the project work covered by this analysis falls under the criteria of undertakings, which can receive NHPA clearance using these streamlined procedures. Most work conducted under the proposed project is of a nature that has very limited potential to effect cultural resources. These are exempt from case-by-case review under appendices A, B, and C of the 2004 Programmatic Agreement. Those cleared under Appendix B in that document would be inspected or monitored as required under the 2004 Programmatic Agreement.

The Proposed Action will have no effects to heritage or cultural resources known to occur in the allotment, based on these findings, a determination of "no historic properties affected" is proposed for the project pursuant to 36 CFR 800. The heritage report was sent to SHPO and the Tribes on July 21, 2016 for consultation (Umatilla National Forest Heritage Project: # R2019061400047). SHPO concurrence was received on August 11, 2016, there was no response from the Tribes.

Existing Conditions

This section evaluates and compares the existing and reference conditions of heritage resources within the assessment area. The term "heritage resources" is used to encompass archeological sites, in-use historic buildings (and other structures and features), and traditional cultural properties (TCPs). To complete this analysis, several types of information were used to gather heritage resource data, including heritage resource types and the distribution of those resources on the landscape; in order to understand how this project could affect them. A literature search identified site types and the effects on those sites by other similar projects completed in the past, and also helped to describe the distribution of heritage resources based on altitude, slope and aspect; procured resources, and proximity to water. Maps were used as a visual tool to identify heritage resource distribution based on location and topography. In conjunction with the Range Specialist, areas of potential cattle effects (APCE) were also identified in the Area of Potential Effect (APE), the latter is defined as Forest Service land within the allotment boundary. The APCE consists of locations where there is disturbance by cattle, which are often area of livestock concentration (e.g., water sources, corrals).

The record of heritage resource sites has been defined by heritage resource survey and reconnaissance activities conducted within the assessment area. All of the project area has been surveyed for cultural resources, and has been inventoried adequately to the standards under the present inventory strategy. Over 40 previous inventories intersect the project area, resulting in the identification of 36 heritage resources in the project area. All of these were recorded in prior surveys. Of these, 13 are sites and 23 are isolated finds. These records include prehistoric (n=24) and historic (n=12). Four sites have been evaluated as eligible to the National Register of Historic Places (NRHP).

Monitoring was conducted at all proposed water development loci, at a sample of areas where livestock might be expected to congregate for periods, and field visits to a sample of heritage sites, with emphasis placed on those that may have experienced some sort of impacts from grazing (e.g., animal trampling). The results of monitoring indicate that previous actions to protect eligible sites from impacts were enacted and are effective. No previously unknown sites or isolated materials were encountered during the on-sites.

The proposed spring developments are areas of highest impact by livestock grazing, as well the probability of having archaeological sites. Therefore, for the purposes of this monitoring report, these areas are the most important and seven of the proposed nine were monitored. No evidence of cultural materials (i.e., site) or isolated finds were encountered. All of these areas displayed the effects of livestock trampling. Development of the springs/seeps should lead to less trampling, grazing, and other disturbances to shallow soiled areas where root crops may grow.

Environmental Consequences

Alternative 1

Under this Alternative, cattle grazing would be eliminated within the Tamarack Allotment. There would be no direct, indirect, or cumulative effects on cultural resources.

Alternative 2

This alternative would maintain the current grazing management in the allotment, including stocking levels, season of use, number of pastures, and grazing rotation. By complying with Section 106 of the

NHPA using the processes outlined in the 2004 Programmatic Agreement with the Oregon State Historic Preservation Office there would be no significant direct, indirect or cumulative effect to cultural resources under this alternative.

Alternative 3

The direct, indirect, and cumulative effects are similar to those described under Alternative 2. The major difference is the miles of new fence and up to nine new water developments that would be constructed under this alternative. Culturally significant plants could see a beneficial impact from implementation of project activities, particularly for their associated habitats. This is due to the fact that the proposed spring developments, fences, and changes to grazing system timing (especially avoiding turn out when fragile soils are still wet) should lead to less trampling, grazing, and other disturbances to the proposed spring development areas, riparian zones that may be fenced off, and shallow soiled areas where root crops may grow.

3.9 Social And Economics

Methodology

This social and economic analysis evaluates the alternatives that would affect grazing related jobs and income, and those allotment improvements and changes in livestock management can affect costs to the permittees and the Forest Service. This analysis did not evaluate the costs of livestock transport, veterinary expenses, supplemental feed, employee payment, maintenance and upkeep of ranch property etc. The social and economic analysis focuses on the indicators which include the number of permitted head months (HM), the expected revenue for the number livestock grazed, value factored for the time spent on the allotment, changes in associated jobs, and change in cost to the permittees and to the agency.

Affected Environment

Forage from federally managed lands is important to ranchers and businesses in all surrounding counties. Forest allotments like the Tamarack Allotment is a key elements of the total year-round ranch operations. The allotment(s) provide forage for cow/calf herds at a time when home pastures are growing and being harvested for winter hay. The Tamarack Allotment is grazed by two permittees for generally four and one half months with 209 head.

Revenues generated through this allotment can be roughly calculated by examining the number of livestock permitted and estimating the potential overall returns for these animals. Currently 209 head of cow calf pairs are permitted on National Forest System lands for about four and one half months. If all 209 cows have one calf and all 209 calves grow to maturity there is a potentially this will produce 209 head of livestock weighing approximately 700 pounds at 12 months of age (cattle are on the allotment for about 38 percent of these 12 months). In 2016 the average price for beef cattle was $206 per hundredweight (cwt). This would calculate from $1442 per beef cow sold or $300 thousand for the 209 head grazed on the allotment.

Additional employment is an important variable contributing to the economic stability of the region. The recommended employee effects from grazing the allotment were derived from a multiplier obtained from the IMPLAN (Impact Analysis for Planning) model for the Umatilla National Forest Impact zone. These IMPLAN coefficients for employment were used in the Final Environmental Impact Statement for the Umatilla Nationals Forest Land and Resource Management Plan. The direct employment coefficient was 0.3 direct jobs 1,000 HM livestock. There are 961 HM of use authorized

on the allotment which would generate approximately five three and a half to four months of work for one to two hired ranch hand(s).

Approximately 25 percent of grazing fees collected are returned from the U. S. Treasury to the local community for roads and schools.

Environmental Consequences

Alternative 1

Direct and Indirect Effects

The National Forest System lands would not provide value or profitability to the current ranching operations associated with the Tamarack Allotment. No Livestock would be permitted on the Tamarack Allotment. This is a 100 percent reduction in value added on National Forest System lands. Additional and likely more expensive pasture or hay would be needed to maintain the livestock and likely lead to 954 fewer AUM's reducing the net farm income for local communities within the State of Oregon. There would be no added employment. No grazing fees would be collected for use in local communities or for National Forest System lands. The economic stimulus, job, and associated services derived from the production of cattle, the movement of products, and the processing, distributing and marketing income would be lost in Oregon's urban and rural economies.

Cumulative Effects

Livestock would not be authorized on the Tamarack Allotment causing a loss in flexibility provided to the ranching operations. There would be no revenue collected through grazing fees reducing payments to roads and schools in local counties by $1,269. With the loss of AUM's there would be a proportionate loss of county, state, and federal tax revenue. Profitability for the permittee authorized on this allotment would be lost.

Alternatives 2 and 3

Direct and Indirect Effects

Alternative 2 and 3 provide economic return for the livestock industry within the State of Oregon. Currently the Tamarack Allotment is providing local, state and federal revenues for livestock grazed on the allotment. Current AUM's on the allotment produce approximately $300,000 through the sale of beef cattle. There is approximately three and a half to four months of employment for 1-2 individual. The Forest Service will collect $1,269 in grazing fees annually provided to the U.S. Treasury.

Cumulative Effects

By continuing grazing on the Tamarack Allotment the associated income from livestock sales would provide proportionally at $300,000 of return to the involved ranching organizations This income is absent business expenses that are required to produce the livestock. Roughly two-thirds of this income is used to produce a profit depending on fixed costs within the individual ranching operations. Fix costs include but are not limited to animal care, fuel, insurance, equipment costs, land payments, interest on borrowed money, and living expenses etc. County, state, and federal tax revenue would continue to be collected for the production of livestock permitted on this allotment. Nearly 236 million pounds of beef is consumed annually in Oregon of which 31 percent is produced in Oregon.

Summary of Effects

Table 3-24 displays these indicators by alternative. There would be no change in revenues or costs related to the action alternatives. All costs are averaged. They are relative and should be used for

comparison, not as expected costs. They represent an example based on current costs that are being used to determine values between alternatives.

Table 3-24: Social and Economic Indicators by Alternative

Social or Economic Indicator	Alt 1	Alt 2	Alt 3
Number of Head	0	209	209
Head Months	0	954	954
Period on Allotment (expressed in Months)	0	4.56	4.56
Revenue for time livestock graze the allotment *	0	$300,000	$300,000
Months Employment**	0	3.5	3.5
Grazing Fees***	0	$1,269	$1,269

Number of head and head months from the EA; Period on Allotment = HM/number of head; Revenue for time livestock graze the allotment = number of head X $621 X (12 months / Period on allotment). * Calculations based on 12 month calf (700 lb.) sold at auction (2016 average sale price of $206 cwt) would equal $1442 each. ** 0.3 of a year employee for every 1000 HM livestock grazed. *** HM X 2015 grazing fee of $1.35

3.10 Climate Change

Agriculture and Forestry Practices

The USDA Forest Service Strategic Framework for Responding to Climate Change states the following:

> *Agriculture and forestry practices may either contribute to, or remove greenhouse gases (GHGs) from the atmosphere. Agriculture and forestry have affected GHG levels in the atmosphere through cultivation and fertilization of soils, production of ruminant livestock, and management of livestock manure, land use conversions, and fuel consumption. The primary GHG sources for agriculture are nitrous oxide (N2O) emissions from cropped and grazed soils, methane (CH4) emissions from ruminant livestock production and rice cultivation, and CH4 and N2O emissions from managed livestock waste. The management of cropped, grazed, and forestland has helped offset GHG emissions by promoting the biological uptake of carbon dioxide (CO2) through the incorporation of carbon into biomass, wood products, and soils.*
>
> *In the United States, agriculture accounted for close to seven percent of total GHG emissions, amounting to 7,260 teragrams (Tg) of carbon dioxide equivalents (Eq) in 2005 (EPA 2007). …After accounting for Carbon sequestration related to forestry, agricultural and forested lands in the U.S. were estimated to be a net sink of 306 Tg CO2 Eq. …Livestock production is responsible for…about 22 percent (of the agricultural GHG emissions) from enteric fermentation, 10 percent from managed waste, and 18 percent from grazed lands. It should be noted that the estimates…are for emissions only, and do not account for carbon storage in agricultural soils and forests (USDA 2008).*

Greenhouse Gas Emissions and Livestock Grazing

According to Schuman, Janzen, and Herrick, "grazing lands are estimated to contain 10 to 30 percent of the world's soil organic carbon" (2002). While some studies have found limited to large reductions in soil carbon and increases in CO_2 flux associated with grazing (Haferkamp and Macneil 2004, Welker et al. 2004). Studies involving modeling and remotely sensed data indicate that proper

grazing can improve ecosystem production as measured by soil carbon storage (Li, Liu, and Tan 2007; Steinfeld and Wassenaar 2007; Reeder et al. 2004; Schuman, Janzen, and Herrick 2002).

Additional studies similarly conclude that certain levels of grazing may even increase carbon sequestration (Hellquist et al. 2007; Derner, Boutton, and Briske 2006; Derner et al. 2005; LeCain et al. 2001; Ganjegunte et al. 2005; Manley et al. 1995; Reeder et al. 2004; Schuman, Janzen, and Herrick 2002). Several studies complement these findings because they indicate that light to moderate levels of grazing have no overall effect on total carbon sequestration (Hellquist et al. 2007; Ma XiuZhi et al. 2005, Ingram et al. 2008, Derner, Boutton, and Briske 2006, Stavi et al. 2008, Owensby, Ham, and Auen 2006, Shrestha, and Stahl 2008, Ingram et al. 2008). In fact, intensive rotational grazing appears to be a viable option for greenhouse gas (GHG) reduction and carbon sequestration credits (Bosch, Stephenson, Groover, and Hutchins 2008, Steiguer, Brown, and Thorpe 2008, NRCS 2006, Li, Liu, and Tan 2007, Ingram et al. 2008; Conant and Paustian 2000; Steiguer, Brown, and Thorpe 2008; Streater 2009; Sharrow 2008).

Initially, these findings seem inconsistent with the dual observations that desertification results in a net loss of carbon to the atmosphere and that the rate of desertification has been estimated to be higher for grazing land than for other land uses globally (Steinfeld and Wassenaar 2007, Asner et al. 2004). However, these observations need to be considered in the context that conversion of land use from cropping to grazing increases carbon sequestration (Conant and Paustian 2000, Derner et al. 2005, Sharrow 2008, EPA 2005, Schuman, Janzen, and Herrick 2002).

It can safely be asserted that there is tremendous variability in carbon storage and its response to grazing across different land types (Derner, Boutton, and Briske 2006; Henderson, Ellert, and Naeth 2004). The Northern Great Plains appears to have small potential as a carbon sink (Haferkamp and Macneil 2004). Alternately local research indicates that ungrazed sagebrush steppe sites were CO_2 sinks during the period they were measured (Svejcar et al. 2008). Management practices that maintain or improve the condition of plant associations appear to be consistent with maintaining the soil organic pool. (Henderson, Ellert, and Naeth 2004, Brown and Thorpe 2008, Sharrow 2008).

Free-Ranging Livestock vs. Livestock in Containment Facilities

Grazing leads to redistribution of carbon on the landscape (Stavi et al. 2008). It has been noted that livestock waste management represents a potential long-term soil carbon gain (Fellman et al. 2008). Free-ranging livestock deposit manure across the landscape resulting in aerobic decomposition. Aerobic decomposition of manure generates considerably less methane than does decomposition associated with stockpiling strategies employed in more concentrated livestock production strategies (Alberta Agriculture and Food Ag-Info Center, EPA 2005). This "in-effect" land application of manure also results in a buildup of soil carbon that decomposes much more slowly than occurs when composting (NRCS 2007).

Environmental Consequences

Alternative 1 (No Action)

Under Alternative 1, livestock grazing would no longer occur within the project area. However, although livestock grazing and associated impacts would no longer occur, there would still be an evolution of resource conditions because biophysical processes would continue to occur. The difference between this potential future condition and current conditions for any given portion of land would be dependent on the past level or degree of grazing influence across the landscape. The biophysical processes associated with the emission of GHGs related to livestock production tied to the project area would be altered. Livestock would no longer be authorized to graze within the project area, therefore, there would be no livestock in the project area to produce the methane (CH4) that results from enteric fermentation (the digestive process by which cattle release methane into the

air). The current management system whereby carbon is redistributed across the landscape would cease.

Overall, a similar or reduced level of carbon sequestration and soil carbon build up would be expected within the project area. Management practices that maintain or improve the condition of plant associations appear to be consistent with maintaining the soil organic pool (Henderson, Ellert, and Naeth 2004; Brown and Thorpe 2008; Sharrow 2008), improvement of vegetative conditions in riparian areas that are currently in less than satisfactory condition (see riparian vegetation section) would be expected to increase in their efficacy as carbon sinks.

Under this alternative, the disposition of the displaced livestock that have been grazing within the project area would ultimately determine the actual effect on GHG emissions. Unless these cattle were slaughtered or otherwise perished they would continue to produce CH4 as a result of enteric fermentation.

Many scenarios for the disposition of these displaced livestock would be expected to produce more net GHG emissions than have been produced in the past. Three scenarios where this would be expected to be the case include:

1. Livestock are raised in containment: Under this scenario (most unlikely for a cow/calf operation), livestock would be raised in a feedlot-like environment. Under this scenario, the production of both CH_4 and nitrous oxide (NO_2) associated with the anaerobic decomposition of manure would be expected to be increased dramatically, while CH_4 associated with ruminant digestion would be expected to decrease due to a higher quality of feed.
2. Livestock are moved to private rangeland: Under this scenario, finding unallocated rangeland is unlikely, therefore increased stocking on currently allocated rangeland would be expected. There is potential for rangeland degradation associated with increased stocking rates, which would result in a reduced ability to capture and sequester carbon from the atmosphere.
3. Livestock are moved to private irrigated land: Under this scenario, finding unallocated irrigated pasture is unlikely, so increasing stocking on currently allocated irrigated pasture would be expected. In order to avoid degradation of the irrigated pasture it would be expected that inputs of fertilizer and water would increase. In this case, the potential for the production of CH_4 and NO_2 is dramatically increased, although capture and sequestration of atmospheric carbon is also increased.

Ultimately, regardless of the fate of these particular cattle, the amount of cattle in the United States would likely remain constant because the existence of beef cattle is dependent on consumer demand for beef. Therefore, if cattle cease to exist in one location, it is likely that an equivalent number of cattle will be raised somewhere else to meet consumer demand (Brown 2010). However, when considering this, it should be noted that cattle raised in a different environment and under different conditions may not emit the same amount of CH_4 as the free-ranging cattle on the Tamarack Allotment. However this difference would be negligible when considering such a small amount of emissions.

Alternatives 2 and 3

Alternative 2 is to continue the allotment's current management plan. Livestock levels would therefore not change under this alternative. Because Alternative 3 does not propose any changes to current management regarding the number of livestock grazed, the overall season of use, or allowable forage utilization, its effects would not differ from those of Alternative 2.

The Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2007: Synthesis Report, Summary for Policymakers* describes improved "grazing land management for increased soil carbon storage" as one of the "key mitigation technologies and practices currently commercially available." Therefore, the reduction of grazing impacts associated with Alternatives 2 and 3 could be categorized as both facilitated adaptation and mitigation relative to the October 2, 2008 *Forest Service Strategic Framework For Responding to Climate Change* because, as with Alternative 1, Alternatives 2 and 3 would improve vegetative conditions in riparian areas that are currently in less than satisfactory condition (see riparian vegetation section) and therefore, would be expected to increase their efficacy as carbon sinks.

The annual amount of CH_4 that the proposed number of cattle would emit in the proposed timeframe is a very small percentage of the total amount of CH_4 emitted by beef cattle in the U.S. each year. According to the Environmental Protection Agency (EPA), U.S. beef cattle produce 4,724 kilotons (kt) of CO_4 per year (EPA 2017), which would mean that the average amount of methane emitted by all U.S. beef cows in the same amount of days as proposed under Alternatives 2 and 3 (44,140 head days[5]) would be 571,613 kt. During the same period, the cattle on the Tamarack Allotment would produce 0.012 kt.[6] Therefore, under Alternatives 2 and 3, the cattle on the Tamarack Allotment would produce only 0.00000002 percent of the CO_4 emitted by all U.S. cattle in the same timeframe.

The small amount of methane that cattle would emit under the two alternatives is too small for one to make any inferences as to the effects of its contribution to the total amount of methane produced by U.S. beef cattle, and by all other sources in the U.S. While climate change is a problem that originates in the accumulation of both large and small contributions of GHG gasses into the atmosphere, that overall problem is outside of the scope of the Tamarack Allotment Management Plan project.

The information above makes it evident that Alternatives 2 and 3 meet the Forest Service's mission and the described purpose and need for this project while enhancing the resilience and adaptive capacity of resources to the potential impacts of climate change (USDA 2008). Both Alternatives 2 and 3 incorporate an adaptive management approach that provides flexibility to address inherent uncertainty associated with the local effects of climate change.

3.11 Other Required Disclosures

The Umatilla National Forest has done the required consultation and necessary analyses to ensure compliance with the following laws, regulations, Forest Service policy and the Umatilla National Forest Plan.

Archaeological and Historic Preservation Act

This act requires Federal agencies to collect, protect, and preserve historic and archaeological data that result from agency undertakings and actions. This act also applies to agencies' actions that fund or license projects and the effects these projects have on heritage resources.

Archaeological Resources Protection Act

This act imposes civil penalties for the unauthorized excavation, removal, damage, alteration, or defacement of archaeological resources.

[5] A "head day" refers to one animal occupying the range for one day.

[6] Adding in emissions from the calves in each pair adds only .001 kt, and does not change the final percentage value.

National Historic Preservation Act

This act protects historic and archaeological values during the planning and implementation of Federal projects (CFR 36.800 and CFR 36.60). The law requires the following: (1) location and identification of cultural resources during the planning phase of a project, (2) a determination of "significance" for potentially affected resources, and (3) provisions for mitigation of any significant sites that may be affected.

The American Indian Religious Freedom Act

This act protects American Indian rights to exercise traditional religions including access to sites and freedom to worship through ceremonial and traditional rites.

Native American Graves Protection and Repatriation Act

American Indian burials and sacred items are protected by this act. If human remains or objects of cultural patrimony are discovered, this law requires consultation with the Indian tribe most closely related to the individual. The tribe then determines the appropriate treatment of the remains. This may include repatriation or scientific study and curation at a university.

Treaty Trust Responsibilities

Consultation with tribal entities on a government-to-government basis in reference to activities related to potential disturbance of cultural heritage resources, which include sites, sacred sites, gathering areas, springs and any other areas of interest to tribal nations, is mandated under various executive orders, policies, statutes and case law. Federal land managing agencies including the Forest Service are authorized to consult with American Indian Nations not only under mandated law but also under the U.S. Government's trust responsibility to tribal nations.

Endangered Species Act

There are no federally listed, proposed, or candidate plant species (or habitat for any of these species) in the project area. Therefore, this project will have no effect to any of these species, and all alternatives comply with this law.

National Forest Management Act and National Environmental Policy Act

This biological evaluation discloses the existing condition of sensitive plant populations and habitats, and analyzes the potential effects from the proposed activities to these resources. This report therefore provides all necessary scientific information to comply with the National Forest Management Act and the National Environmental policy act.

Floodplains, Executive Order 11988

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. There would be no new activities proposed within the floodplains and impacts to floodplains would not increase under any of the alternatives from current management. The current management fences off key riparian areas but there are still are streams without fencing. The Proposed Action would provide for additional water source developments and fencing which would further reduce impacts to floodplains. Fencing off the more sensitive streams complies with the direction of E.O. 11988 which directs management agencies to use the most "practicable means and measures to minimize harm". This project is consistent with the E.O. 11988.

Wetlands, Executive Order 11990

Executive Order 11990 requires that the Forest Service to "avoid to the extent possible the long and short term adverse impacts associated with the destruction or modification of wetlands and to avoid

direct or indirect support of new construction in wetlands wherever there is a practicable alternative". The project does not propose to destroy or modify any wetlands, therefore this project is consistent with E.O. 11990. Groundwater dependent ecosystems Best Management Practices (BMPs) provided in the EA and botany report will provide additional protections for wetlands.

Municipal Watersheds

There are no designated municipal watersheds in the Tamarack project area.

Umatilla National Forest Land and Resource Management Plan

All proposed project activities are consistent with the applicable Umatilla National Forest plan goals, desired future conditions, objectives, standards and guidelines.

Executive Order 13007: Indian Sacred Sites

This order directs Federal agencies to accommodate access to and ceremonial use of American Indian sacred sites by tribal religious practitioners, to avoid adversely affecting the physical integrity of such sacred sites, and, where appropriate, to maintain the confidentiality of sacred sites.

Executive Order 13175: Consultation and Coordination with Indian Tribal Governments

This order directs Federal agencies to establish regular and meaningful consultation and collaboration with Tribal officials in the development of Federal policies that have Tribal implications. Tribal governments were contacted and provided information during the analysis process (see Tribal Relations Section, Chapter 1). This project was also discussed during Program of Work and Government-to-Government Consultation meetings.

Executive Order 12898: Environmental Justice

No local minority or low-income populations were identified during scoping or environmental effects assessment. No minority or low-income populations are expected to be affected by implementation of any of the alternatives.

Prime Farmland, Range Land, and Forest Land

No adverse effects on any prime farmland, rangeland, and forestland not already identified in the Final FEIS for the Forest Plan would be expected to result from implementation of any alternative.

Civil Rights, Women, and Minorities

No adverse effects on civil rights, women, and minorities not already identified in the FEIS for the Forest Plan would be expected to result from implementation of any alternative. All action Alternatives would be governed by Forest Service contracts, which are awarded to qualified contractors and/or purchasers regardless of race, color, sex, religion, etc. Such contracts also contain nondiscrimination requirements.

Energy Requirements

No adverse effects on energy requirements would be expected to result from implementation of any alternative.

Visual Quality

No issues for visual quality were identified during scoping.

Inventoried Roadless Areas

No Inventoried Roadless Areas are located within the Tamarack grazing allotment.

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APPENDIX A: BEST MANAGEMENT PRACTICES AND APPLICABLE PROJECT DESIGN CRITERIA

Project design criteria (PDCs) serve to mitigate impacts to critical resources. Best Management Practices are design criteria that assure FS compliance with CWA including state water quality standards. The purpose of the rangeland National Core BMPs is to avoid, minimize, or mitigate adverse effects to soil, water quality and riparian resources that may result from rangeland management activities (USDA, 2012).

http://fs.fed.us/biology/resources/pubs/watershed/FS_National_Core_BMPs_April2012.pdf

The range core BMPs are based on administrative directives that guide and direct the FS planning and permitting of livestock activities on FS lands.

BMP Range-1 (Rangeland Management Planning)

BMP Range-1 (*Rangeland Management Planning*) covers planning for grazing allotments. The planning process which includes the 2017 Tamarack Allotment EA is consistent with the guidance. The planning process identified measures to include in the Allotment Management Plan (AMP) to avoid, minimize, or mitigate adverse impacts to soil, water quality, and riparian resources from rangeland management activities.

BMP Range -2 (Rangeland Permit Administration)

BMP Range -2 (*Rangeland Permit Administration*) provides practices to be used when administering rangeland permits, including controlling overall livestock numbers, distribution and season of use. The Tamarack permit, AMP, AOI and monitoring requirements are consistent with this direction addressing all the recommended practices.

PDC#	Project Design Criteria
Range 2 -Rangeland Permit Administration (RPA): Practices to be used when administering rangeland permits, including controlling overall livestock numbers, distribution and season of use.	
Objective: *Protecting soil and water resources through management of livestock numbers and season of use.*	
RPA 1	Permission to turn out must be obtained from the Forest Officer at least five (5) days in advance of livestock being turned out on designated forest allotments. Livestock entry onto the allotment or into a specific pasture will not be permitted until: Soils are dry enough to prevent damage Key plant species are ready to withstand grazing.
RPA 2	The off-date for a pasture is when stock are to be fully out of the pasture, or in the case of the last pasture in the rotation, fully off the Forest. It may be necessary to begin gathering early or hire additional riders to achieve this.
RPA 3	If implementation standards are reached on key areas prior to the scheduled move/turn off date, livestock will be required to move to the next pasture or off the Forest earlier than scheduled.
RPA 4	Livestock numbers, season of use, and movement may be adjusted each year through the Annual Operating Instructions to allow for resource management needs.

PDC#	Project Design Criteria
RPA 5	Adjustments to livestock numbers, season of use, and movement may also be made during implementation to respond to resource conditions that develop as the season progresses. These conditions may include: drought, wildfire, achievement of key plant species utilization levels, stubble height, etc. The type of mitigation used will be determined by the Forest Officer in charge, based on the degree of the problem and its cause. If mitigation activities do not achieve desired results, additional action will be taken (for example, reductions in stocking or season of use in subsequent years).
Objective: *Preclude concentration of stock in areas that are sensitive to concentrated use and/or preclude prolonged use of an area which will result in loss of vegetative cover and soil compaction.*	
RPA 6	In no case will salt be placed closer than ¼-mile to streams or other wetlands without prior approval. Salting and bedding areas will not be located within 300 feet of any known heritage resource site.
RPA 7	Project maps in Annual Operating Instructions will show current, inventoried, high priority, noxious weed infestations to be avoided and/or monitored.
RPA 8	Noxious weed prevention measures (as listed in the Noxious Weed Report located in the analysis file) will be incorporated in management plans where ground disturbance is likely. Information on noxious weed identification, methods of spread and prevention measures will be provided to permittees in Annual Operating Instructions.
Objective: Safeguard water quality under sustained forage production and manage forage harvest by livestock and wildlife.	
RPA 9	Forage resources will be allocated on a pasture-specific basis to meet basic plant and soil needs as a first priority. Forage production above basic resource needs will be available to wildlife and permitted livestock.
RPA 10	Management activities will be designed and implemented to retain sufficient ground vegetation and organic matter to maintain long-term soil and site productivity.

BMP RANGE-3 (RANGELAND IMPROVEMENTS)

BMP Range-3 (Rangeland Improvements) provides guidance for construction and maintenance of structural and nonstructural range improvements such as water sources. Additionally AquEco-3- (Ponds and Wetlands) and WatUses-3 (Administrative Water Developments) practices would also apply to this project.

PDC#	**Project Design Criteria**
Range 3 -Rangeland Improvements (RI): practices to be used for the construction and maintenance of structural and nonstructural range improvements such as water sources.	
Objective: *Protecting soil and water resources during the construction and maintenance of range improvement.*	
RI 1	Include and schedule improvement actions and maintenance in the AMP and grazing permit.
RI 2	Range specialists will consult with a hydrologist and/or fish biologist prior to pond maintenance and the development of the new water sources. The specialists will review the BMP guidance in Range-3 (Range Improvements), AquEco-3- (Ponds and Wetlands), AquEco-4 (Stream Channels and Shorelines) and WatUses-3 (Administrative Water Developments); and identify site-specific BMPs.

PDC#	Project Design Criteria
AquEco-3- Ponds and Wetlands, AquEco-4 Stream Channels and Shorelines (AQ) and WatUses-3 Administrative Water Developments (WU): Practices to be used when designing and implementing pond and wetland projects to avoid, minimize or mitigate adverse effects to soil, water quality and riparian resources.	
Objective: *Protecting soil and water resources when designing and implementing pond and wetland projects.*	
AQ 1	Use appropriate measures to protect the waterbody when preparing for construction or maintenance activities.
AQ 2	Conduct operations during dry conditions.
AQ 3	Identify suitable areas away from waterbodies for disposal sites before beginning operation.
AQ 4	Avoid heavy equipment in wet meadows and riparian areas. Operations will only occur in dry conditions.
AQ 5	Promptly rehabilitate or stabilized disturbed areas as needed following construction or maintenance activities. Promptly compact fills to avoid or minimize erosion. Contour sit to disperse runoff, minimize erosion, stabilize slopes and provide a favorable environment for plant growth.
AQ 6	Use suitable measures to protect the spring when preparing the site for construction or maintenance activities. Locate access and staging areas near the project site but outside of work area boundaries, streamside management zones, wetlands and sensitive soil areas. Refuel and service equipment only in designated staging areas. Consider using small, low ground-pressure equipment and/or hand labor where practicable.
AQ 7	Ensure all equipment operated in or adjacent to the waterbody is clean of aquatic invasive species as well as oil and grease.
AQ 8	Erosion control will be utilized in areas of soil disturbance by heavy equipment or other ground disturbing activities.
WatUses-3 Administrative Water Developments (WU): Practices to be used when developing and operating water sources to avoid, minimize or mitigate adverse effects to soil, water quality and riparian resources.	
Objective: *Protecting soil and water resources when developing and operating water sources.*	
WU 1	Locate the water trough, tank or pond at a suitable distance from the spring or channel to avoid or minimize adverse effects to the spring, channel as well as wetland/riparian vegetation.
WU 2	Design the collection system to avoid, minimize or mitigate adverse effects to the spring development and downstream waters from excessive water withdrawal, flooding, sedimentation, contamination, vehicular traffic and livestock as needed.
WU 3	Use suitable measures to avoid and minimize erosion at the overflow of water trough, tank or pond.
WU 4	Periodically monitor the spring development and promptly take corrective action for sediment buildup in the spring box, clogging of outlet and overflow pipes, diversion of surface water for the collection area and spring box, erosion from overflow pipes, and damage from animals.
WU 5	Water source should be fenced if boggy.

Sensitive Plants Design Criteria

PDC#	Project Design Criteria
Sensitive Plants (SP) and Habitats Objective: *To protect known sensitive plant populations and their current habitats by preventing disturbance to the individual plants and the immediate area.*	
SP 1	Salting should not be authorized or allowed within one-quarter mile of occupied habitat of threatened, endangered, or sensitive plant species, except when protected by fencing.
SP 2	Prior to construction of fences or placement of jackstraw, a botanist should clearly mark sensitive botanical sites to minimize ground disturbance.
SP 3	If any new sensitive plant populations are located, a Forest Service botanist will be notified. The population will be evaluated, and a mitigation plan shall be developed in consultation with the botanist.
SP 4	Fence construction and other operational activities shall not be allowed in any documented sensitive plant sites unless it is for the demonstrated benefit or protection site.
Sensitive and Unique Habitats (UNQH) Objective: *To protect from direct disturbance the unique habitats that harbor, or potentially harbor, a number of sensitive plant species. These habitats represent the majority of locations where sensitive species occur on the Umatilla National Forest.*	
UNQH 1	The integrity of unique habitats shall be maintained. Unique habitats [may] include meadows, rim rock, talus slopes, cliffs, animal dens, wallows, bogs [fens], seeps and springs. This shall be accomplished by incorporating cover buffers approximately 100 feet in width during fence-building projects.
UNQH 2	To the extent possible, constructed fences will be placed outside the channel migration zone (floodplain).
Groundwater-Dependent Ecosystems (GDE) Objective: *To protect the types of habitat where the largest number of sensitive plants in the forest are found. These criteria will prevent soil and hydrological disturbance during project implementation, specifically relating to spring developments, this will help to maintain the habitat characteristics necessary for sensitive plant populations.*	
GDE 1	The integrity of groundwater-dependent ecosystems (GDE) shall be maintained. Spring developments shall not dewater GDEs. Spring developments shall not be allowed if the spring is occupied by rare or sensitive plant species, or in peatlands, fens, or where historic soils are present.
GDE 2	Fence construction shall not be allowed in springs, seeps, or any other GDE, unless it is for the benefit or protection of the GDE or development of the spring.
GDE 3	Spring developments should not disturb the spring orifice (point where water emerges). Spring head boxes should be placed in a location that will cause the least amount of disturbance to the soils and vegetation of the GDE. Preferable locations for spring head boxes should be in an established channel downstream from the orifice or a location where flowing water becomes subsurface.
GDE 4	Spring developments shall have a return flow system to minimize the diversion of surface and subsurface water from the catchment area. Consider using a float valve or similar device to reduce the amount of water withdrawn from the GDE.
GDE 5	When developing springs, place troughs far enough away from GDEs, wetlands, and other sensitive or unique habitats to prevent erosion, compaction, or degradation to sensitive soils and vegetation due to livestock congregation.

PACFISH STANDARDS

The following Forest Plan standards (PacFish) associated with livestock grazing apply to all Riparian Habitat Conservation Areas and activities outside of Riparian Habitat Conservation Areas that will degrade them.

GM-1: Modify grazing practices (e.g. accessibility of riparian areas to livestock, length of grazing season, stocking levels, timing of grazing, etc.) that retard or prevent attainment of Riparian Management Objectives, or are likely to adversely affect listed anadromous fish. Suspend grazing if adjusted practices are not effective in meeting Riparian Management Objectives and avoiding adverse effects on listed anadromous fish.

GM-2: Locate new livestock handling and/or management facilities outside of Riparian Habitat Conservation Areas. For existing livestock handling facilities inside Riparian Habitat Conservation Areas, assure that facilities do not prevent attainment of Riparian Management Objectives or adversely affect listed anadromous fish. Relocate or close facilities where these objectives cannot be achieved.

GM-3: Limit livestock trailing, bedding, watering, salting, loading, and other handling efforts to those areas and times that will not retard or prevent attainment of Riparian Management Objectives or adversely affect listed anadromous fish.

WILDLIFE PROJECT DESIGN FEATURE

WILD-1: The height and design of these fences will be designed for the free movement of elk this includes the bottom wire no less than 18 inches above the ground, while total height would not exceed 38 inches.

STANDARDS FOR INVASIVE SPECIES PREVENTION

Standards for Invasive Species Prevention from the Pacific Northwest Region Invasive Plant Program Final Environmental Impact Statement, Record of Decision, October 2005 that applies to the Tamarack Allotment.

Standard #1: Prevention of invasive plant introduction, establishment and spread will be addressed in watershed analysis, roads analysis, fire and fuel management plans, recreation management plans, vegetation management plans, and other land management assessments. (This standard will apply to all assessments and analysis documents started or underway as of March 1, 2006; this standard does not apply to assessments and analysis documents signed or completed by February 28, 2006.)

Standard #2: Actions conducted or authorized by written permit by the Forest Service that will operate outside the limits of the road prism (including public works and service contracts), require the cleaning of all heavy equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering National Forest System Lands. This standard does not apply to initial attack of wildland fires, and other emergency situations where cleaning would delay response time.

Standard #3: Use weed-free straw and mulch for all projects conducted or authorized by the Forest Service on National Forest System Lands. If State certified straw and/or mulch is not available, individual forests should require sources certified to be weed free using the North American Weed Free Forage Program standards, or a similar certification process.

Standard #4: Use only pelletized or certified weed free feed on all National Forest System lands. If state certified weed free feed is not available, individual Forests should require feed certified to be weed free using North American Weed Free Forage Program standards or a similar certification process. Choose weed-free project staging areas, livestock and packhorse corrals, and trailheads.

Standard #6: Use available administrative mechanisms to incorporate invasive plant prevention practices into rangeland management. Examples of administrative mechanisms include, but are not limited to, revising permits and grazing allotment management plans, providing annual operating instructions, and adaptive management. Plan and implement practices in cooperation with the grazing permit holder.

Standard #13: Native plant materials are the first choice in revegetation for restoration and rehabilitation where timely regeneration of the native plant community is not likely to occur.

Design Criteria of all Action Alternatives for Invasive Plants (IP)

IP-1 Noxious weeds will be considered under this analysis. (Prevention Standard #1)

IP-2 Maps in the Allotment Management Plans will show current, inventoried, high priority, noxious weed infestations to be avoided and/or monitored. (Prevention Standard #6)

IP-3 Noxious weed prevention measures will be incorporated in allotment management plans. Information on noxious weed identification, methods of spread, and prevention measures will be provided to permittees verbally or in Allotment Management Plans. (Prevention Standard #6)

IP-4 Permittees will be encouraged to identify new infestations of noxious weeds and report these annually to the Forest Service. (Prevention Standard #6)

IP-5 All equipment used off of the road prism will be cleaned in a manner sufficient to prevent noxious weeds from being carried onto the analysis area. This requirement does not apply to passenger vehicles or other equipment used exclusively on roads. Cleaning will occur off of National Forest System lands. Cleaning will be inspected and approved by the Forest Officer in charge of administering the project. (Prevention Standard #2)

IP-6 Any seed or straw used in restoration will be certified weed free. The first choice being native seed. (Prevention Standards #3 and #13)

IP-7 Pelletized or certified weed free feed will be required on the Tamarack Allotment. (Prevention Standard #4)

APPENDIX B: PAST, PRESENT, AND FUTURE PROJECTS

This appendix lists the past, present, and reasonably foreseeable future actions that may be considered in additional to the proposed project. The present and reasonably foreseeable future actions that are considered for cumulative effects analysis may vary by resource (see Chapter 3 and resource reports for resource-specific details).

Table B- 1: List of Actions Considered for Cumulative Effects

Project Name	Date	Size	Location/ SWS	Method	Residual (Existing) Condition
Livestock Grazing	1800s-1920s	Across Analysis Area	Analysis Area	Unregulated grazing, season long, highest intensity of livestock grazing.	Past high intensity livestock grazing degraded riparian and upland plant communities. Though monitoring has shown that changes in livestock grazing have since significantly improved riparian and upland vegetation, riparian and upland plant communities are still generally below the potential vegetation. Non-native stabilizing species were seeded in the past and those species are still present today across the analysis area. Past effects to stream characteristics still exist today (decrease in stream bank stability).
Livestock Grazing	1920's-1940's	Across Analysis Area	Analysis Area	Prior to 1920 sheep grazed the allotment.	
Livestock Grazing	1950's-1960's	Across Analysis Area	Analysis Area	Pasture division fences constructed and rotational grazing strategies implemented. Grazing intensity continued to decrease.	
Livestock Grazing	1970's-1980's	Across Analysis Area	Analysis Area	Riparian fences were constructed, livestock grazing intensity continued to decrease.	
Riparian Fences	1990's-Present	9.25 miles	Wall Creek SWS	Permanent fences are used to improve livestock management in riparian areas.	Improved riparian vegetation on streams within the Tamarack Allotment.
Livestock Water Source Development	Prior to 1980's	62 Water Developments	Analysis Area	Push-up earthen dams or old road pits for ponds and constructed cement springbox, trough, and piping for troughs	Provides habitat and water for wildlife and livestock. Reduces impacts caused by livestock on riparian vegetation and streambanks.
Hardman Allotment	1800's-present	21003 acres	Outside Analysis Area	Current Permitted Use: 322 c/c from 6/1-9/30	Consistently meeting Forest Plan Standards.
Tamarack-Monument Allotment	1800's-2004	38,123 acres	Analysis Area and Outside Analysis Area	Administered as one allotment until 2004 when the Tamarack and Monument Allotments were split by administrative decision.	Permitted Use prior to 2004: 401 c/c from 5/1- 9/15.

Project Name	Date	Size	Location/ SWS	Method	Residual (Existing) Condition
Collins Butte Allotment	1800's-present	17030 acres	Outside Analysis Area	Current Permitted Use: 277 c/c from 6/1- 10/15	Consistently meeting Forest Plan Standards.
Winlock Allotment	1800's-present	5173 acres	Outside Analysis Area	Current Permitted Use: 134 c/c from 5/15- 7/15.	Consistently meeting Forest Plan Standards.
Yellow Jacket Allotment	1800's-present	7,605 acres	Outside Analysis Area	Current Permitted Use: 115 c/c from 6/1-9/30	Consistently meeting Forest Plan Standards.
Monument Allotment	1800's-present	18,678 acres	Outside Analysis Area	Current Permitted Use: 292 c/c from 5/1-9/15	Consistently meeting Forest Plan Standards.
Stone Hill Allotment	1800-1995	2910 acres	Outside Analysis Area	Vacant/Admin by DOI- Priveville BLM.	Grazing has not occurred within Umatilla NF lands for a long time because this area is unsuitable for cattle grazing because of limited water and access (steep slopes).
Tamarack LO and Cabin Rental	Earl 1900's-Present	Lookout and Cabin Area	Analysis Area	Summer use of Lookout during Fire Season. Seasonal renting of Lookout Cabin to public.	Still in use with plans to continue use of the site.
Firewood Cutting			Throughout analysis area within 300 feet of open roads.	Cutting and dragging trees within 300 feet of open roads	Reduced number of snags available for wildlife (particularly cavity nesting birds and mammals) along roads, although snags generally are not lacking in most stands. Large snags protected by regulations. Driving off forest roads to gather firewood has displaced a small amount of soil in localized areas (same as dispersed recreation). Gathering prohibited in riparian areas, so no loss of shade/future instream wood. Reduction of down wood. Supply of fuel to local citizens. Changes fuel profile.
Mushroom Gathering			Analysis area	Hiking or driving ATVs to harvest mushrooms.	No ground impact. Not many growing sites due to low elevation and lodge pole and lack of fire.
Reforestation (See Timber Sale names)	1979-Present		Analysis Area	Hand planting mixed conifer species	Changed species composition to ponderosa pine and larch. Will replace wildlife cover in the long-term (stands that are already 20 years old are now providing hiding cover).
Pre-Commercial Thinning	1974-Present		Analysis Area	Hand thinning by chainsaw	Changed species composition to pine and larch. Changed stand structure. Enhanced tree growth, resiliency.

Project Name	Date	Size	Location/ SWS	Method	Residual (Existing) Condition
					Untreated debris remains a fire hazard for up to 10 years post- treatment. Decreased big game hiding cover. Briefly reduced shade in riparian areas, then encouraged remaining trees to grow larger providing more shade than the original stand. Improved tree growth increased for potential large instream wood in the long-term, increasing the likelihood of pool formation.
Activity burns/prescribed fires	1970-present	9,074 acres	Analysis Area	Burning of fuels resulting from harvest activity and landscape burning.	Reduced fuel levels resulting from harvest activity. Soil sterilization and disturbance from more recent activities. Increased seedling survival due to reduced competition.
Fire Suppression	1900's-present		Analysis Area		Fuel loads above normal due to suppression of fire cycle. Throws other ecological processes off track: reduces nutrient cycling, increases other disturbances (insects, disease, and fire mortality). Some soil exposure occurred, but recovered in a year so no longer a concern. Change in tree species to more fire-intolerant Douglas-fir and grand fir. Change in stand structures to multi- canopied, dense forest.
Wildfires <6000 acres in size.	2005-present		Sunflower Fire Monument Fire	Outside Analysis Area	Created some snags/down wood and instream wood, burned others. Burned some riparian vegetation, leaving small portions of stream without shade. Created small openings that serve as forage for big game and wildlife. Some soil exposure, recovered in a year. Fires of this size likely show no residual effects now beyond some black snags.
Dispersed Campsites within the analysis area (Umatilla Nat Forest-2010 data)	20+	.25 acres +	Tamarack Analysis Area	Use of National Forest land outside of designated campgrounds for camping	Popular recreational use of this area. Continued soil compaction, reduction of large wood near streams, unstable inhibits bank stabilization, provides recreation. Human occupancy has reduced vegetation and snags in local area around campsites.

Project Name	Date	Size	Location/ SWS	Method	Residual (Existing) Condition
					Vehicles and foot traffic caused soil compaction. Sites along streams reduced shade and potential large instream wood, destabilized streambanks, and human waste increased nutrient input in some areas. Reduced vegetation, increased soil disturbance, and vehicular access spread noxious weeds to some sites. Human use resulted in uncontrolled fire starts.
Bull Prairie Campground	1950's-present	48 acres	Wilson Cr. 6th HUC	Primary use is recreation (non-motorized on lake).	Includes and 6 acre lake shore with a man-made dam for season long storage of water.
Morrow County OHV park	2001-present	8,201 acres	Outside Analysis Area	Primary use recreation	Morrow County has done a lot to maintain multiple uses on park and to manage area for timber, grazing and recreation.
Prineville BLM Land Exchange 2005. Near Analysis Area	2005-present	49,190 acquired lands	NFJD River-Potomus Cr. and Wall Creek 5th HUC	Primary use-Recreation	Closed roads and use limited to walk-in only on a majority of the area.
ATV trails	Trail ID 2400002 and 2309022	Trails within analysis area (#) 2400002= 3.05 miles. 2309022=1.54 miles	Upper Kahler Cr. 6th HUC and Middle Big Wall 6th HUC	The trails can be used season long but used mainly during hunting season.	Trails are inter- connected using existing road beds (some opened and closed roads)
Road Construction/ Maintenance			Analysis Area	Standard maintenance work items may include blading of roadbed, ditch cleaning, culvert cleaning and maintenance, culvert installation and replacement as needed, spot rocking, slide and slough removal, placement of subgrade reinforcement. Work is scheduled annually based on need, priorities, safety and resource protection and available funds.	Decreased fire suppression response time and roads serve as usable fireline to aid wildfire control. Improved human access to wildlife with increased disturbance and hunting vulnerability of animals. Created openings, edge habitat for wildlife. Reduced area of soil/forest productivity. Increased drainage network due to stream crossings. Increased drainage area allowing sediment to be transported directly to streams from roads (no filtering). Where construction occurred along or crossing creeks, all riparian vegetation was removed along the roadbed, in some cases leaving long stretches

Project Name	Date	Size	Location/ SWS	Method	Residual (Existing) Condition
					of creek without shade. Loss of trees along creeks reduced potential large wood, indirectly decreasing pool formation and quality of fish habitat. Increased fish passage barriers. Soil disturbance and vehicle use spread noxious weeds. Increased recreational use. Construction created maintenance costs.
ATM Plan Implementation-West End	2005		Analysis Area	Installed closure signs on all roads, with some berms or barricades as well. In addition, closed area to cross-country use by OHVs.	Decreased public access. Decreased overall road maintenance cost. Increased use and associated maintenance of other roads. Decreased human disturbance of wildlife and associated hunting vulnerability. Soil and forest productivity slowly recovering on some roads.
Road Decommissioning/ Obliteration	2008	Decommissioned 1.3 miles of road	SF Wall Creek-Analysis Area	Removed signs, constructed barricades, removed structures, removed culverts, stabilized, recon toured, planted vegetation.	Increased sediment until revegetated. Decreased soil compaction. Returned land to soil/forest productivity. Increased riparian vegetation/stream shade, which reduced stream temps. Returned vegetation traps sediment. Decreased overall maintenance cost. Increased use and associated maintenance of other roads. Poorly closed/decommissioned roads led to increased road use violations and damage.
Storm Proof Roads within Wall Creek Watershed Analysis	2014	Cleaned Ditches and Hardened Road Surface on 2402 road	SF Wall Creek-Analysis Area	Placed large rock on road surface to reduce sediment	Reduce long term maintenance cost on road system. Stabilize road system during snow and rain events and spring run-off.
Snowmobile Routes (Road Number 2400,	Present		Analysis Area	Access areas during winter months	Winter Recreation is important in this area (snowmobile, cross country skiing, snow shoes/hiking).
Ant Hill (TS)	1972	41 acres	Analysis Area	Salvage Cut (intermediate treatment, not regeneration)-Various Ground-Base Mechanical Methods	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
Bologna Basin (TS)	2004-2009	643 acres	Analysis Area	Salvage Cut (intermediate treatment, not	Remove diseased trees reduce fuel loads, improve

Project Name	Date	Size	Location/ SWS	Method	Residual (Existing) Condition
				regeneration)-Various Ground-Base Mechanical Methods	forest health. Overstory removal, hazard tree removal,
Dark Canyon (TS)	1966	2734 acres	Analysis Area	Salvage Cut (intermediate treatment, not regeneration)-Various Ground-Base Mechanical Methods	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
Grassy Butte. (TS)	1971	52 acres	Analysis Area	Salvage Cut (intermediate treatment, not regeneration)-Various Ground-Base Mechanical Methods	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
Happy Jack (TS)	1969	2350 acres	Analysis Area	Salvage Cut (intermediate treatment, not regeneration)-Various Ground-Base Mechanical Methods	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
Putnam (TS)	1988-89	200 acres	Analysis Area	Salvage Cut (intermediate treatment, not regeneration)-Various Ground-Base Mechanical Methods	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
S.F. Wall Creek (TS)	1964	3705 acres	Analysis Area	Salvage Cut (intermediate treatment, not regeneration)-Various Ground-Base Mechanical Methods	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
Southern Hazard Tree Removal (TS)	2000	329 acres	Analysis Area	Mechanical	Remove snags along open roads/trails that are safety concerns.
Tamarack (TS)	1977	2662 acres	Analysis Area	Mechanical	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
Tamarack Comm. Thin (TS)	1997	123 acres	Analysis Area	Mechanical	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
Upper Wall (TS)	1993	.3 acres	Analysis Area	Mechanical	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
Wall Creek (TS)	1962	129 acres	Analysis Area	Mechanical	Remove diseased trees reduce fuel loads, improve

Project Name	Date	Size	Location/ SWS	Method	Residual (Existing) Condition
					forest health. Overstory removal, hazard tree removal,
West Bologna (TS)	1976	3133 acres	Analysis Area	Mechanical	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
Wildhorse Reoffer (TS)	2004	43 acres	Analysis Area	Mechanical	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
Wilson Creek (TS)	1968	20 acres	Analysis Area	Mechanical	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
Rimrock (TS)	2002-2004	1922 acres	Analysis Area	Mechanical	Remove diseased trees reduce fuel loads, improve forest health. Overstory removal, hazard tree removal,
Kahler (TS)	2016-present	4290 acres	Analysis Area 12th HUC	Mechanical	Commercial Thin, Salvage, Pre-commercial Thin, Juniper treatment (lop and scatter and firewood). Activity units burning, landscape burning, pile burning. Temp road use.
UMF Invasive Plant Treatment Project EIS 2010	2010-present	Currently 1050 acres on 35 sites	Analysis Area		Treat identified sites chemically, biologically and manual treatment. Depends on treatment effectiveness and availability of funding for treatment. Also implement prevention standards to reduce new infestations. Using EDRR to identify new infestation and treating those infestation while they are relatively small.
UMF Invasive Plant Treatment Project EIS 2010	2010-present	Currently 4326 acres on 350 sites	Outside Analysis Area	Heppner Ranger District	Treat identified sites chemically, biologically and manual treatment. Depends on treatment effectiveness and availability of funding for treatment. Also implement prevention standards to reduce new infestations. Using EDRR to identify new infestation and treating those infestation while they are relatively small.
1910 Fire 18 (Wild Fire)	1910	725 acres	Analysis Area	Fires that burned during dry summer conditions.	Most fires in the Tamarack Allotment burned understory fuels and were not stand replacement fires.
Swale (Wild Fire)	1978	67 acres	Outside Analysis Area	Fires that burned during dry summer conditions.	Most fires in the Swale Creek Allotment burned understory fuels and were not stand replacement fires.

Project Name	Date	Size	Location/ SWS	Method	Residual (Existing) Condition
Ditch Creek (Wildfire)	1978	2 acres	Outside Analysis Area	Fires that burned during dry summer conditions.	Most fires in the Swale Creek Allotment burned understory fuels and were not stand replacement fires.
Copple #1 (Wildfire)	1978	8 acres	Outside Analysis Area	Fires that burned during dry summer conditions.	Most fires in the Swale Creek Allotment burned understory fuels and were not stand replacement fires.
Monument (Wildfire)	2006	7942 acres	Outside Analysis Area	Fires that burned during dry summer conditions.	Most fires in the Swale Creek Allotment burned understory fuels and were not stand replacement fires.
Sunflower (Wildfire)	2014	6811 acres	Outside Analysis Area	Fires that burned during dry summer conditions.	Fire burned east of the allotment in the Wall Creek Watershed.
Fence Maintenance	Annually	Riparian, Division, Boundary, Corrals and enclosures fences	Within Analysis Area	Permanent	Using power and hand tools to maintain fences to a high standard. Use of heavy equipment as needed.
Water Source Maintenance	Annually	62 developments	Within Analysis Area	Cleaning, replacement of pipe or tank	Localized soil disturbance. Using power and hand tools to maintain fences to a high standard. Use of heavy equipment as needed.

APPENDIX C: RESPONSE TO COMMENTS

Letters were sent on December 12, 2016 to invite interested and affected parties to participate in the public comment period on the draft EA. On December 20, 2016, a legal notice was published in the *East Oregonian*, initiating the 30-day public comment period on the draft EA. Comments received on the draft EA on or before January 19, 2017 were considered timely and were addressed in Appendix C of this final EA. Only one comment letter was received during the public comment period. Relevant comments provided by Karen Coulter, Blue Mountain Biodiversity Project (BMBP) are captured in the following table. Issues and concerns were placed into subject categories based on the topic. Based on the comments provided on the draft EA modifications were made this final EA to help clarify concerns identified during the public comment period.

Table C-1: Response to Comments Received on the draft EA.

Comment Number	Statement/Issue/Concern	Subject Category	Response to Comment (and notes to aid in response)
BMBP A1	Why has there been no allotment management plan renewal process and EA since 1978? That was 39 years ago! Isn't there a legal requirement to update livestock allotments with Environmental Assessments at least every 10-15 years?	RANGE	In the Rescissions Act of 1995 (P.L. 104-19, Section 504), Section 504 specifically addressed allotment analysis, grazing permit issuance and compliance with National Environmental Policy Act (NEPA) and other environmental laws. The Rescissions Act does not expire nor does the Rescissions Act set a timeframe for completion of the allotment NEPA analysis. In response to 2002 litigation, courts determined that the agency had no authority to modify the original allotment NEPA schedule produced under section 504(b) of the Act, if the agency had failed to adhere to the original schedule for NEPA analysis for and allotment (Great Yellowstone Coalition, et al. v. Bosworth; and Western Watersheds Project and Idaho Conservation League v. Sawtooth National Forest, et al.). In response to that litigation, Congress provided additional direction concerning grazing permits in several appropriations bills, including the 2004 Interior Appropriations Act (P.L. 108-108), Section 325. Specifically, Section 325 clarifies that strict adherence to the original allotment NEPA schedule is not required. Section 325 provided the following direction: "that notwithstanding Section 504 of the Rescissions Act (109 Stat. 212), the Secretaries in their sole discretion determine the priority and timing for completing required environmental analysis of grazing allotments based on the environmental significance of the allotments and funding available to the Secretaries for this purpose". Subsequent appropriation laws have reiterated this Congressional intent.
BMBP A2	Why has it been 22 years since the Recession Act of 1995 before there was a renewal plan for this allotment?	RANGE	Please see response to comment A1.
BMBP A3	If livestock grazing is not consistent with the goals and objectives of the Forest Plan, there is no	RANGE	Livestock grazing is consistent with the Forest Plan goals of assisting "supplying lands, resources, uses, and values which meet local, regional, and national social and economic needs" (page 4-1) and providing "suitable range for livestock grazing" (page 4-2), while managing the forage resources to improve

Comment Number	Statement/Issue/Concern	Subject Category	Response to Comment (and notes to aid in response)
	"need" to reauthorize livestock grazing.		"vegetation trend in areas in less than 'fair' condition and for an upward or stable trend for areas in 'fair'or better condition. Monitoring information in specialist reports and the draft Environmental Analysis (EA) indicate that resource conditions are improving on the allotment. Best Management Practices (BMPs) and continued implementation of grazing standards and guidelines will continue to enhance and improve resource conditions on the Tamarack Allotment (Range Report-Monitoring Summaries).
BMBP A4	Responsiveness to the issues identified are not indicated just by invasive plants and riparian impacts for Issue #1 but also by low stubble height and bare ground in broader areas, shrub layer, and erosion, which can lead to in growth of more small trees and increased sediment flows at the expense of native plant diversity and associated wildlife, fish, and soil integrity. Re: Issue #2 indicators should also include indicators of shorter grazing seasons, pasture rotations, livestock exclusion from riparian "pastures" or cancelation of particularly grazing-and of course riparian impacts should be indicators, including attainment or non-attainment of INFISH/PACFISH RMOs.	RANGE	Clarifications were made in the body of the EA to address this comment. Indicators were developed by the resource specialists in their analysis (Chapter 3). These indicators were used to measure the change of each resource condition based on the activities proposed. Indicators described in Chapter 3 were added to Section 1.5 of the final EA identifying how each analysis indicator responded to the issues identified during the comment period.
BMBP A5	The "extensive management system identified in the Forest Plan "for current management under Alternative 2 should of at least been summarized or outlined in the EA so that reviews of this EA could know what its goals, objectives, timelines, and strategies actually are – as relevant to Alt. 2. What are the "management systems and techniques" used "to obtain relatively uniform livestock distribution and forage use to maintain vigor"? If these date back to the Forest Plan, they are very outdated management systems and techniques, and are likely not as good as more	NEPA	The 1990 Forest Plan identifies the range management strategy (FP 463-65) for the Forest. Specific to the Tamarack Allotment, Forage utilization standards are described using Range Management Strategy C (Extensive). Monitoring results outlined in Appendix B, C, and D of the range report indicated that utilization standards (Strategy C- Extensive) have been consistently met on the Tamarack Allotment. The goal outlined in the Umatilla Land and Resource Management Plan (Forest Plan 4-63) for range management states; manage the forest resource for an upward vegetative trend in areas in less than "fair" condition and an upward trend for areas in "fair" or better condition, while providing for forage productivity and making suitable range available for livestock grazing. Increase the level of forage production where cost efficient and consistent with other resource goals. Appendix A of the final EA identifies the applicable 2012 Best Management Practices (BMPs) and mitigation measures that are implemented on the Tamarack Allotment to safeguard water quality, soils and the vegetation resource. These BMPs were incorporated from National Best Management Practices for Water Quality

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	updated practices based on current best available science.		Management on National Forest System Lands (USDA, 2012) The grazing strategy outline in the EA in Chapter 2 is identified as a deferred rotational grazing system (final EA, page 17). A deferred rotational grazing system on the allotment is compatible with elevation differences, aspect and vegetation types within the allotment. Livestock use patterns that occur on the allotment are related to livestock distribution, and the timing and intensity/duration livestock spend within pastures on the allotment. Although upland water developments are critical to maintain livestock distribution on the allotment, other "management techniques" are also used in to improve livestock distribution. This includes but is not limited to; allowing livestock to enter a pasture/allotment when soils and vegetation conditions a favorable; herding livestock away from sensitive areas, limiting the number of days livestock spend in a pasture/allotment, and mineral placement (final EA, Appendix A). Vigor refers to key forage species health (final EA, page 17). Maintaining vigor of these key forage plants, grasses and shrubs primarily used by wild and domestic ungulates, involves forage plants having the ability to set seed and/or reproduce vegetatively and to maintain root reserves and leaf material for photosynthesis.
BMBP A6	We are very concerned regarding these being 62 water developments – ponds and springs – for cattle, as in our experience this means the end of biodiversity and natural functioning for the spring affected due to trampling and de-watering by cattle. Livestock "ponds" are often like polluted cesspools and are often constructed upstream of historic aspen stands, depriving aspen of their natural and adequate water supply. Most of these artificial livestock "ponds" are completely denuded around the water by heavy cattle use, as are the areas around livestock troughs at springs.	RANGE	BMPs for Range Improvements including water developments are described in Appendix A under the section titled BMP Range-3 (Rangeland Improvements). These BMPs provide guidance for construction and maintenance of structural and nonstructural range improvements such as water sources. There are also BMPs for groundwater dependent ecosystems to prevent soil and hydrological disturbance during project implementation, specifically relating to spring developments, this will help to maintain the habitat characteristics necessary for sensitive plant populations.
BMBP A7	If the Forest Service commits itself to beneficial changes in management under Alternative 3, they need to be able to guarantee that these changes will be implemented, not just "as funding allows." There seems to be plenty of funding for rampant ecological destruction in the form of logging, roading, and allowing	RANGE	Constructing additional fencing on Lost and Dark Canyon Creek would be necessary to graze livestock prior to July 15th, (consultation date). The draft EA indicated June 30th as the consultation date, but was corrected in the final to reflect the date that was originally consulted on. Additional fencing would maintain consistency with the Letter of Concurrence of adverse effects from grazing.

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	cattle damage to occur, but not to prevent ecological damage. The Forest Service must secure funding for these changes.		
BMBP A8	These repeated "Error! Reference source not found" warnings in the EA text tend to indicate missing citations that should have been incorporated in the EA. Such glitches make this allotment renewal look like a rubber-stamping exercise.	NEPA	These editorial changes were made between the draft and final EA. Reference sources links identifying the tables referenced within the draft EA were inadvertently broken when finalizing the document and have been fixed within the body of the final EA.
BMBP A9	BMPs, Forest Plan and PACFISH standards and guidelines currently being implemented should have been disclosed in this EA, not just in a range report we didn't know to request enough in advance to actually receive it in time for consideration in our comments. How do we know that these would ensure improvement of resource conditions when we are not allowed to see them in the EA?	RANGE	Copies of all associated reports were published to the project website during the comment period. These documents were available for public inspection and were incorporated by reference in accordance with 40 CFR 1502.21... A list of applicable BMPs, PACFISH standards, Forest Plan standards and guidelines, and project design criteria were added to Appendix A of the final EA.
BMBP A10	This EA is so short on details as to how "slightly faster rates of improvement" would be accomplished that is impossible to judge whether (e.g.) "changing livestock management strategies that do not maintain distribution of livestock within the allotment" would work, as we have no idea what these strategies are, or how well they have worked in the past, or whether there are other, better alternative strategies that could be used. This is very inadequate analysis under NEPA.	RANGE	A faster rate of improvement of resource conditions refers to a lower ecological state to a higher ecological state in less time. Indicators are identified in the Range Report page 11 (summary of monitoring results). Appendices (B, C, D, and F) of Range report contains monitoring data with conclusions and summaries of monitoring data. The Range Report and all appendices were published to the project website during the comment period. These documents were available for public inspection and were incorporated by reference in accordance with 40 CFR 1502.21.
BMBP A11	This is ridiculously biased and inadequate cumulative effects analysis for Alt's 2 & 3. Just saying so does not make it true. Where is the substantiation for claims of Tamarack	FISHERIES	The indirect effects analyses for hydrology and fish habitat provide rationales supporting that effects to various physical parameters that affect fish habitat would be small and immeasurable (final EA, page 82). Given that those small, immeasurable effects would be added to cumulative effects of other past, present and reasonably foreseeable future activities

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	Allotment livestock use not having "the potential to result in any meaningful cumulative effects to water quality, stream flows, or the sediment régime that would affect sensitive or listed fish or sensitive aquatic invertebrates"? What a sweeping claim to make regarding livestock use plus roads, plus logging, etc. in the allotment area! This is absurd. On what basis are Alts 2 and 3 allowing livestock grazing, including within RHCAs, deemed not to have "measurable elements" that would incrementally add to any effects from other past, present, or reasonably foreseeable actions in the affected sub water sheds? Livestock grazing impacts, and logging and road impacts to water quality, sediment, & streams are well documented.		described in the hydrology and fisheries sections, it would be speculative to determine that there would be measurable cumulative effects from continuation of current grazing or even more conservative management as described in Alternative 3 (final EA, page 83).Risk of cumulative effects to fish habitat would be reduced through additional fencing as needed to protect spawning areas from livestock use prior to July 15th. Otherwise, management decisions are based on indicators intended to ensure that there will be no cumulative effects to fish habitat from ongoing (Alternative 2) grazing management or from modified grazing management as described in Alternative 3. Passive restoration through natural processes through avoidance of measurable negative effects, is expected to be ongoing. There are no other reasonably foreseeable future projects in the allotment, whose effects to water quality, sediment, and streams that can be assessed for cumulative effects purposes at the present time.
BMBP A12	Re: Table 3-2 – 61% of Designated Critical Habitat – a whopping 414, 647 acres – for Threatened-listed Mid- Columbia Steelhead trout being grazed by livestock is hardly reassuring! Of course there are cumulative impacts to steelhead and to other fish species and aquatic invertebrates from most of this DCH being used by livestock, as well as being affected by road use and logging and other sources of sediment, loss of stream shading, and loss of riparian plants to stabilize channels and shade streams. Yet this obvious outcome is not analyzed. It's very unlikely that these direct, indirect, and cumulative effects are not "measurable" in the Tamarack Allotment area.	FISHERIES	Livestock management (timing of grazing, intensity of grazing and duration of grazing while cattle are grazing on the allotment) along with existing upland water developments and proposed water developments, riparian fencing, mineral placement, and herding of livestock are deigned to distribute livestock grazing effects away from sensitive riparian areas where there are listed and or sensitive fish species and Designated Critical habitat (DCH) (final EA, page 82).Lost Canyon is not designated critical habitat (DCH), and Dark Canyon is only grazed in the upper section. Grazing occurs after July 15th. Alternative 3 proposes additional fencing in Dark Canyon to protect the riparian area from livestock grazing and to reduce effects to riparian habitat.
BMBP A13	Why is elk displacement by cattle in the Tamarack Allotment considered to be only "minor?" Has this been studied on the ground in the Tamarack	WILDLIFE	Impacts of grazing within the Tamarack Allotment to Rocky Mountain Elk are described in the Wildlife BE in the project record and summarized in the body of the final EA. As noted in the analysis, the Tamarack Allotment lies within the Heppner big game management unit (BGMU). Within this unit the elk

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	Allotment, or is this just an assumption with no concrete basis?		population has been increasing slightly in the last several years, from a level of approximately 2,400 elk in 2006 to the current estimate of 5,400 elk in spring 2015 (ODFW 2015; final EA, page 30). Due to the availability of habitat that cattle are unable or unwilling to access and the fact that cattle are not present in the entire allotment all of the time (during the grazing season), impacts to elk (nutrition, body condition) related to avoidance or other competitive interactions with cattle would continue to be minor, and the same as those that are currently occurring in the allotment (final EA, page 31)..
BMBP A14	What is the basis for these assumptions? (See par. 2, EA p. 21, 1st 2 sentences.)	WILDLIFE	Range Report Appendix B Forest Plan Monitoring Shows Slight use in upland (6-20%) at the end of the grazing season on the Tamarack/Stalling pasture. Slight uses is defined as the rangeland has the appearance of very light grazing. The key herbaceous forage plants may be topped or slightly used. Current seed stalks and young plants of key herbaceous species are little disturbed (Range Report, page 27). The impacts of livestock to migration corridors and big game use areas is described on page 31 and 32 of the final EA.
BMBP A15	Why is it not “expected” that early and mid-season livestock grazing would leave pastures deficient in forage quantity for wintering elk? Where is the evidence for all these optimistic assumptions? Why are there no photos of grazing conditions in winter range, suspected calving areas, etc. in the EA?	WILDLIFE	See page 32 of the final EA. The reduction in the standing crop of herbaceous forage that would occur as a result of grazing is not expected to limit forage for wintering elk because Condition and Trend plot monitoring and attainment of stubble height standards indicates that Forest Plan standards for allowable forage utilization (percent forage removed by weight) are being met within the allotment. This indicates that adequate forage is being allocated to wildlife (elk and deer) to meet big game management objectives. Consistent attainment of standards indicates that forage quantity would not be limited on winter range habitat. If winter ranges were grazed in the late season, there would be a potential for upland shrub browse by cattle. In the Tamarack Allotment, late season grazing of winter ranges would not occur. Available forage would be sufficient to support the elk population within the allotment.
BMBP A16	We appreciate the grazing system rotation and decreased cattle stocking, as well as riparian fencing that are resulting in stable or upwards trends in vegetation and soil condition. We also appreciate the monitoring done and permittee cooperation. However, a stable trend could still reflect serious legacy...	NEPA	Thank you for your comment. Comment provide no evidence other than the opinion of the commenter.
BMBP A17	What is the evidence for the assumptions that cattle grazing is not affecting elk calving areas, is not adversely affecting range land conditions and is not adversely affecting elk	WILDLIFE	See response to comments A13 to A14 and analysis on page 32 of the final EA. Cattle are grazing lower elevation areas (Stalling Butte and Little Tamarack pastures) early to mid-season. Elk are primarily calving in Wildhorse pasture areas. Cattle don’t enter this pasture until July.

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	populations? Even if standards for grazing are generally being met, this does not guarantee no conflict with elk forage and calving habitat needs.		
BMBP A18	Do elk never calve after May 1st?	WILDLIFE	See final EA page 30, calving season is typically mid-May through mid-June (Toweill and Thomas 2002). Anecdotal observations indicate that portions within the Wildhorse pasture are used by elk for calving. Season of use on Wildhorse pasture is between mid to late season after June 30th through September 15th. The season of use for livestock is outside of the Elk calving season.
MBP A19	We do greatly appreciate that permittees on the Tamarack Allotment are meeting stubble height standards.	RANGE	Thank you for your comment. Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a sense of views and beliefs about a proposed course of action.
BMBP A20	This is grossly inadequate cumulative effects analysis for cattle grazing effects to elk. Clearly cattle are a large desert ecosystems of eastern Oregon, whereas elk were historically a part of this ecosystem (albeit as a different sub- species - Roosevelt elk.) There is no way that cattle use of elk habitat does not contribute to same degree to adverse effects to elk.	WILDLIFE	See pages 33 and 34 of the EA for the effects of livestock grazing to Elk. Elk diets overlap with livestock throughout grazing season, timing of cattle in pastures, low livestock numbers and improved distribution of livestock, minor effects.
BMBP A21	It is not accurate to claim that continued livestock grazing on the Tamarack allotment would have no indirect or direct effects to Gray Wolf, as: “It is reasonable to conclude that at some point in the future wolves are likely to be present within the allotment (Berkley and Hickman 2015).” (EA p. 30). Wolf livestock conflicts are the leading cause of the killing of wolves in Oregon threatening their population viability. In Washington, the Fish and Wildlife Service has been actively trying to eradicate an entire wolf pack due to livestock conflicts. This would be reduction of wolves in the state by about 20%, a serious blow to Gray Wolf recovery. Active livestock allotments in National Forests are a	WILDLIFE	Wolves currently federally protected West of Highway 395 in the state of Oregon. Wolves do not currently reside on the Heppner Ranger District and there are no denning or rendezvous sites within the analysis area. See page 41 of the final EA.

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	direct threat to Wolf recovery and must be recognized as such. While saner alternatives to killing wolves exist to resolve conflicts with livestock, the OR Dept. of Fish and Wildlife has shown a disturbing trend of killing wolves.		
BMBP A22	30 miles away from the allotment is not far for wolves.	WILDLIFE	See response to comment A22.
BMBP A23	As there could well be foreseeable direct and indirect impacts to wolves from livestock grazing (Alt 2 or 3) in the Tamarack allotment, there are also cumulative impacts to wolves that remain unanalyzed in the EA.	WILDLIFE	See response to comment A22.
BMBP A24	Indicates reasons for our concerns-in this case re: potential cattle impacts to Columbia Spotted frogs within the Tamarack allotment-as well as marking the starting points of individual comments.	WILDLIFE	Thank you for your comment.
BMBP A25	The cumulative impacts conclusions of “no cumulative reduction in suitable habitat for the spotted frog” and “there would be no adverse cumulative impacts to populations or the distribution of the Columbia spotted grog at the scale of the Tamarack Allotment” do not logically follow from the previous analysis disclosing multiple cumulative impacts to Columbia spotted frog habitat and individuals. Ongoing livestock grazing is definitely part of those ongoing impacts.	WILDLIFE	Thank you for your comment. Comment provide no evidence other than the opinion of the commenter. Cumulative impacts refer to the long term effects on the species in that location. Due to the unlikely nature of potential direct impacts (trampling at water sources) and the low intensity of expected impacts (due to stocking levels and monitoring data) (final EA, page 43-46), there would be no adverse cumulative impacts to populations or the distribution of the Columbia spotted frog at the scale of the Tamarack Allotment. See Wildlife Report pages 20-21.
BMBP A26	Commercial thinning under the Kahler project had better not occur within RHCAs as no commercial thinning within RHCAs was part of our negotiated settlement of our objection to the Kahler sale with the Heppner Ranger District!! Please confirm that no	NEPA	Thank you for your comment. You are correct commercial thinning is not proposed within RHCAs. The analysis was updated to reflect the change in the Kahler project design based on our objection resolution agreement for the Kahler Dry Forest Restoration Project.

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	commercial logging of RHCAs in Kahler is taking place.		
BMBP A27	We do not see adequate substantiation for the conclusion that Alt's 2 and 2 would not contribute to a trend towards federal listing or to an eventual loss of viability to the population.	WILDLIFE	Thank you for your comment. Comment provide no evidence other than the opinion of the commenter. Effects are discussed on pages 20-21 of the Wildlife Report and summarized on pages 43 to 46 of the final EA.
BMBP A28	We are not encouraged by the statement that the (action) alternatives "would not incrementally increase impacts on this species beyond what is already occurring", because what is obviously occurring already is a serious decline in Columbia Spotted frog populations that renders them imperiled/vulnerable.	WILDLIFE	See page 44 of the final EA. Livestock would not trample or otherwise disturb potential oviposition sites and egg masses in ponds and slow-moving streams within the allotment because livestock would enter the allotment after eggs have hatched (Bull and Hayes 2000). Bull and Hayes (2000) found no scientifically significant difference in the abundance of recently metamorphosed Columbia spotted frogs between grazed and ungrazed ponds in eastern Oregon. A similar study found no difference in egg mass counts, larval survival, or size at metamorphosis following exclusion of cattle from ponds in northeast Oregon (Adams et al. 2009). A reduction of riparian vegetation (grasses and shrubs) through grazing may increase the susceptibility of spotted frogs to predation by reducing hiding cover. It is unlikely that reduced height of grasses in the allotment would adversely impact cover habitat for spotted frogs because PACFISH/IIT stubble height monitoring has consistently met standards in the Tamarack Allotment. This monitoring indicates that although vegetation (height) is reduced during the grazing period, residual cover is present in the allotment after livestock are removed.
BMBP A29	It is not clear from the analysis that there would be no cumulative reduction in suitable habitat from continued livestock grazing, nor that there would be no measurable impacts to populations through continued cattle grazing within the Tamarack allotment under Alternatives 2 or 3. This is an overstatement of gains made in livestock management to conclude there will be no cumulative reduction in suitable Columbia spotted frog habitat and no measurable impacts to Columbia spotted frog populations from cattle use of their riparian habitat.	WILDLIFE	See response to comment A28.
BMBP A30	The Purpose and Need for livestock allotment renewal cannot be renewed of	NEPA	Thank you for your comment. Comments that state a position for or against a specific action are appreciated as this gives the Responsible Official a

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	livestock grazing no matter what the consequences for attaining PACFISH RMOs, protecting the viability of a listed species, or meeting other Forest Plan goals or legal requirements. Therefore No Action (no grazing) is a viable alternative that could meet the purposed need, as this must include meeting legal requirements.		sense of views and beliefs about a proposed course of actions. The range of alternatives includes the no grazing alternative and the proposed action includes project design features to protect and enhance water quality and sensitive species habitats. The no grazing alternative is analyzed in detail in the EA and compared to the effects of implementing both action alternatives. The decision maker will decide whether or not to continue to authorize grazing, based on careful review of the analysis, the project record and public input.
BMBP A31	There have been no fish surveys in South Fork Big Wall Creek and Dark Canyon Creek since 1994, even though steelhead trout were observed there then? Why not? How can the Forest Service successfully manage for ongoing fish species protection under the ESA without ongoing fish surveys?	FISHERIES	Fencing on South Fork Wall Creek was completed in 2000 to keep cattle out of stream where there would be potential spawning (personal communication with range specialist), as part of the original ESA informal consultation on this allotment, for which we received a Letter of Concurrence. We reinitiated and completed consultation again in2013 (project record). We are managing the habitat whether or not ESA-listed species are present, per PACFISH direction since 1995. Funds for fish and fish habitat surveys are very limited, and surveys are based on priorities each year. Resurvey of Dark Canyon and SF Big Wall have not been high priority due to existing management and consultation outcomes.
BMBP A32	Why has only Big Wall Creek had continuous temperature monitoring in the Tamarack allotment? How RMO attainment progress is assessed without measuring all the requisite RMO criteria, and how is Oregon Clean Water Act compliance ensured without monitoring other stream water temperatures?	HYDROLOGY	Direct measurement of National Forest stream temperatures using digital thermographs has been ongoing for many years, with data collected at more than 100 stream locations on the Umatilla NF with some sites have more than ten years of record. The US Forest Service stream temperature monitoring program is recognized as one of the longest and most extensive systems with our data being currently utilized to analyze long term climate records and trends. The current program stretches the limits of our funding and personnel with little capacity to add additional sites. Big Wall Creek was likely selected as a monitoring site due to the size of the stream and most sensitive beneficial use which is the protection of salmonids through various life stages. The current temperature record on Big Wall Creek is one of the longest, continuous sites on the forest. The entire mainstem length of Big Wall Creek within the Tamarack Allotment is fenced. Kahler Creek below Tamarack is meeting temperature standards (see DEIS Hydrology – Resource indicator – Stream Temperature section). The FS responsibilities under the Clean Water Act are defined in a Memorandum of Understanding between Oregon Department of Environmental Quality and the Forest Service (ODEQ and USDA, 2014). The MOU recognizes BMPs as the primary mechanism to control nonpoint source pollution on FS lands. BMPs are developed by the FS as part of the planning process. BMPs for this project are included in Appendix A of the document. It is difficult to find perennial water other than Wall Creek after 7/15 most years (personal observation range specialist).
BMBP A33	We are concerned that Big Wall Creek has such high	HYDROLOGY	Year-to-year fluctuation in stream temperatures is expected regardless of management actions due to a

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	water temperatures, exceeding water temperature standards for steelhead and Redband trout, and that these water temperatures have increased, and stayed higher since 1996 and 1997.		wide range of contributing factors such as air temperatures, streamflow and both short-term and long-term weather patterns. The stream temperatures during the first two years of monitoring in 1994 and 1995 were higher than 1996 and 1997 in Big Wall Creek. In fact, the average of the 7-day maximum average temperatures for the last eleven years (2005-2016) is actually slightly lower (74.2 °C) that the first eleven years of record (1994-2004) (74.3 °C) by 0.1°C.
BMBP A34	Big Wall Creek temperatures are especially of concern to us because in the 1990s it was Bull trout habitat. Is Big Wall Creek still active Bull trout habitat? Bull trout require lower, colder water temperatures of 56f.	FISHERIES	Big Wall Creek was never identified as bull trout habitat by ODFW in the 1990s (Buchanan et al, 1997, pages 69-73). Monitoring data shows temperatures for Big Wall Creek are not
BMBP A35	There is no good reason why the specific stream reach data concerning PACFISH habitat and watershed condition elements are only located in the project file and not in the EA. This information should have been incorporated in the EA.	NEPA	Copies of all associated reports were published to the project website during the comment period. These documents were available for public inspection and were incorporated by reference in accordance with 40 CFR 1502.21.
BMBP A36	We are concerned that there is no pools/mile RMO data even for Big Wall Creek, as well as for Lost Canyon Creek, and that the other two creeks have a very low number of pools per mile	FISHERIES	The previous stream survey on Big Wall Creek was conducted in 1997. Instead of a pools/mile indicator the survey used pool/riffle ratio which does not translate to PACFISH RMOs.
BMBP A37	We are also concerned by the complete lack of data for Lost Canyon Creek and by two out of three creeks not meeting the standard for bank stability... What does “10” mean for width to depth ratio for Dark Canyon Creek? Based on information on EA p. 59, steelhead trout have been observed in Tamarack Creek during red surveys, so Tamarack Creek should be a fish-bearing stream, yet is not listed as such in Table 3-14. This is a serious omission since “no other sub watersheds in the Tamarack Allotment have streams with observed steelhead or DCH. “(EA p. 59).	FISHERIES	We do not have a stream survey for Lost Canyon Creek; therefore we cannot provide data. The bank stability values presented here were obtained prior to installation of riparian fencing. The “10” value for depth to width is a ratio. Values 10 and less indicate that the stream is narrow and deep. Values above 10 indicate that the stream is wide and shallow. Narrow and deep means the water tends to be colder and less evaporation. Wide and shallow allows for water to heat up and evaporate quickly. Tamarack Creek data has been added to Table 3-14 in EA. Tamarack Creek is a fish-bearing stream up to the allotment boundary There is no DCH on Tamarack Creek in Tamarack allotment, according to National Marine Fisheries Service. Lost Canyon doesn’t have a barrier, in 2015 steelhead and redds were observed in Lost Canyon Creek.

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BMBP A38	While implementation and effectiveness monitoring are included as the basis for ensuring that there are no adverse effects to ESA – listed species, and to their Designated Critical Habitat, this monitoring should include more comprehensive and up to date fish surveys, stream temperature monitoring, and RMO attainment monitoring such as for pools per mile (no data for Big Wall, Lost Canyon and Tamarack Creeks) and bank stability and width to depth ratio (missing for Lost Canyon and Tamarack Creeks.) (see EA p. 60)	FISHERIES	Tamarack Creek data has been added to Table 3-14 in Draft EA. No Lost Canyon Creek stream survey. Fish and fish habitat surveys are conducted as limited funds allow and are based on priorities. Fish and fish habitat surveys conducted under regional protocols are inventories, and are not intended for use as monitoring tools. Trend Monitoring for RMO attainment is being conducted by the PACFISH/INFISH Biological Opinion Monitoring Team. Day et al (2015) noted that in the NFJD subbasin, allotment monitoring sites show statistically significant increases in LWD. "Statistically significant increases in LWD across reaches in the NFJD subbasin is an initial indication that stream reaches will likely continue to improve. LWD is one of the first variables expected to respond to changes in management in riparian areas under PACFISH. Other geomorphic channel variables take longer to respond to changes in management. Increases in LWD should have a positive effect on other channel variables that take longer than the 10-year period sampled to respond to changes in management. LWD is an important driver of stream channel processes and improves bank stability, increases channel complexity and aquatic habitat, and can increase pool percentage, depth, and complexity."
BMBP A39	At what point with PACFISH RMOs ever be attained to protect steelhead trout and other fish species habitat, as long as there is continued livestock use? RMOs are not being met now on streams where data is being gathered.	FISHERIES	PACFISH direction was created to retard/arrest the degradation to habitat. Riparian Management Objectives are indices for assessing habitat condition and trend and are not standards.
BMBP A40	Fish habitat conditions need to be improved over the current status quo, not just maintained.	FISHERIES	The PACFISH indicator that we are improving in this allotment is bank stability. This has been accomplished by fencing riparian areas and in Alternative 3, also developing upland water sources as needed to improve distribution and draw livestock away from riparian areas. Reduced use of riparian areas will enable natural processes to continue improving habitat metrics slowly, prognosis is that most metrics, including bank stability, will improve more slowly than recruitment of LWD, which is currently the metric showing most improvement (Day et al 2015).
BMBP A41	Comparing Figure 3-5 with Figure 3-6 (EA pp. 61-69), it is evident that not all steelhead trout habitat and Designated Critical Habitat have been fenced off so that cattle are excluded to prevent cattle impacts to Threatened-listed fish species habitat. How are cattle impacts to steelhead habitat and DCH being	FISHERIES	Grazing in the Tamarack allotment is designed to be in compliance with PACFISH (BA, page 13) and is monitored to evaluate outcomes (BA, page 30). Effects to habitat are insignificant (Letter of Concurrence, page 5).

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	prevented where there are no enclosure fences?		
BMBP A42	What are the specifics, or trigger points of the guidelines established for moving livestock through the pasture rotation? What are the "easily measured indicators" referenced that are claimed to deal directly with livestock effects on stream channels and riparian plants? Why are there no specific results from implementation monitoring (e.g. stubble height and utilization standards) disclosed in this EA? These details need to be included in the EA so as to clearly support conclusions of effects of the proposed grazing management-or not. If current management practices are working to prevent livestock impacts and more toward RMO attainment, let's see the evidence- monitoring report results, guidelines used, photos of conditions, including stubble height monitoring. How are aspen, willows, alders, Red Osier dogwood, and other riparian shrubs doing?	RANGE	The range report is part of the project file and was made available during the comment period on the Draft Tamarack Allotment Management Plan Environmental Analysis. The range report identifies utilization standards and monitoring data specific to the Tamarack Allotment. Within the Botanical Report, section 3.5 of the Draft Environmental Analysis, It states that Aspen trees in the Blue Mountain area are generally in decline, and so is the habitat for those sensitive species that inhabit aspen communities. The Tamarack area has no documented aspen or other hardwood trees in the corporate GIS layers. Both the district range conservationist (Tim Collins) and the botanists who conducted the project specific botany surveys (Mark Darrach, Sandra Robins, and Laurie Allen) all indicated (personal communication and botany survey records) that there is very little aspen in the allotment. The other riparian shrubs mentioned are present within the allotment, but there is no population data for these species.
BMBP A43	Indicates support for our comments and concerns in the text of the EA when not indicating the starting point of each written comment.	NEPA	Thank you for your comment.
BMBP A44	Since no grazing would decrease the amount of fine sediment delivery to streams, why is no grazing considered to only maintain sediment and not improve this indicator? The EA admits that no grazing would improve the functioning condition of riparian vegetation, which includes trapping of fine sediment such that if does not enter the stream.	RANGE	"Maintain" as used in this instance, indicates that there would be no immediate measurable improvement. Improvement will occur very slowly through natural processes and may not be easily detected for up to 10 or more years (Day et al 2015), even with reduced livestock impacts.
BMBP A45	A "slight" reduction of sediment into streams is still an improvement re:	FISHERIES	See response to comment A44

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	substrate embeddedness, so why is this indicator considered to be only maintained by no grazing and not improved? These seem to be biased conclusions attached to reasonable analysis.		
BMBP A46	What specific BMPs are being implemented that lessen or avoid nutrient loading or chemical contamination of water sources? Fencing has not excluded cattle from all streams.	HYDROLOGY	The EA acknowledges under the action alternatives potential instream disturbances would include substrate trampling, bank erosion and manure delivered into the stream system. However, no streams are listed for exceeding the bacteria standards including E.coli. Under Alternative 3 additional fencing will allow restrict livestock from some riparian areas and additional water sources will facilitate movement of cattle from sensitive riparian areas. BMP Range -2 (Rangeland Permit Administration) (appendix A) provides practices to be used when administering rangeland permits, including controlling overall livestock numbers, distribution and season of use.
BMBP A47	What are the terrain features that prevent cattle access to fish-bearing streams?	FISHERIES	Page 64 EA describes direct and indirect effects in Alternative 2. Steep terrain, downed trees, and fencing limit the amount of fish bearing streams that cattle can access. See BA Figure 6 for contours with elevations displaying steep terrain, and Table 8 p. 15 describing, by stream, management actions to prevent or limit cattle access to steelhead streams. The rationale is explained in greater detail in the Biological Assessment in the project file, and the accompanying Letter of Concurrence for a Not Likely to Adversely Affect determination for Middle Columbia Steelhead and their Designated Critical Habitat.
BMBP A48	We appreciate that fencing and terrain prevent cattle access to fish bearing streams during summer months and low flow periods, if that is the time period of “during this time”.	NEPA	Thank you for your comment.
BMBP A49	This is in direct contradiction to a statement on EA p. 63 that: “Monitoring has also determined vegetation cover and bank stability are not consistently maintained along streams.” Which statement is accurate?	FISHERIES	Thank you for your comment. The word “not” was a typo and was removed to be consistent with the monitoring information.
BMBP A50	So why are Big Wall and Tamarack Creeks not meeting PACFISH width to depth ratios, and what can be done re: livestock use (& logging) to improve attainment of this RMO?	FISHERIES HYDROLOGY	See final EA, Section 3.3 and 3.4. Big Wall Creek experienced a 100-year event in 1964 followed by another large event in 1996. These large events sometimes mobilize rocks, debris and soil scouring the channel to bedrock and removing stabilizing elements in the channel such as large wood. This is a natural process in our system but previous management which reduces forest cover as well as wildfire can increase the likelihood of these events.

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			Large wood increases sediment accumulation by acting as an obstruction. Natural recruitment of large wood to previous levels takes many decades. Cattle and other ungulates within streams can also reduce bank stability. Alternative 3 will reduce the stream impacts of cattle by fencing several miles of stream and creating additional water upland sources.
BMBP A51	So how were Dark and Lost Canyon Creeks selected for additional riparian fencing? Are these stream segments occupied or Designated Critical habitat for steelhead trout? What is the current level of cattle damage to these sections of the two creeks now? Are these areas particularly showing more cattle damage? All of this should have been discussed in the EA. How would the additional upland spring developments be constructed? How far away from springs would the associated cattle troughs be located? What is the current riparian condition of these springs? How would the springs be affected by proposed development for cattle? How large an area around the springs would be fenced off? Why are none of these details included in the EA? We would like to see photos of the current conditions of these springs and if they are developed, for adaptive management to take place through yearly monitoring. We are very upset by the degraded condition of most springs from livestock water developments.	FISHERIES	Refer to Fisheries report page 4. Spawning has been observed this year (2016) in Lost Canyon where two redds were identified, however; this is the first year that redds have not been found in Dark Canyon Creek or South Fork Big Wall Creek (pers. comm. Tom Fritz 5/11/2016). No redds have ever been found in Tamarack Creek due to a Box Culvert that acts as a fish barrier. Regardless of flow only a thin sheet of water covers the bottom in the culvert and makes fish passage impossible (pers. comm. Tom Fritz 5/11/2016). No DCH on Lost Creek; however, Dark Canyon Creek is DCH. Refer to Range report pages 32-33 photo points. No observed damage by cattle. The specialist's reports with this information are available to the public. BMPs for Range Improvements including water developments are described in Appendix A under the section titled BMP Range-3 (Rangeland Improvements). These BMPs provide guidance for construction and maintenance of structural and nonstructural range improvements such as water sources. BMP RI-2 (Appendix A) directs that range specialists will consult with a hydrologist and/or fish biologist prior to pond maintenance and the development of the new water sources. The specialists will review the National BMP guidance for Water Quality Management on Forest Service Lands (USDA, 2012) for the following categories: Range-3 (Range Improvements), AquEco-3- (Ponds and Wetlands), AquEco-4 (Stream Channels and Shorelines) and WatUses-3 (Administrative Water Developments); and identify site-specific BMPs to protect water quality and aquatic habitat.
BMBP A52	We are concerned that Alternative 3 is not expected to improve attainment of PACFISH RMOs but only maintain current conditions, even though many RMOs being met, including stream temperature, pool abundance, bank stability, and width to depth ratio. What more can be done through this allotment renewal to move this	FISHERIES	See previous responses to A39 and A40.

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	indicators toward attainment of RMOs? No grazing "riparian" pastures could be established for trouble spots until riparian conditions have improved sufficiently in trouble spots to allow livestock grazing. Why is this not considered? No grazing would improve stream temperatures and reduce fine sediment inputs, helping with width to depth ratios.		
BMBP A53	We are concerned that not all PACFISH RMOs are being monitored to assess attainment progress and to trigger adaptive management when these RMOs are not attained.	FISHERIES	Monitoring data (Range Report, pages 8-38). Fencing proposed in Alternative 3 is designed to reduce grazing impact on Lost Canyon and Dark Canyon (final EA, page 85). No HOBO data has been collected within the Tamarack allotment. HOBO data collected adjacent to (downstream) from the allotment in Kahler and Big Wall Creeks (Fisheries Report, page 12-14).
BMBP A54	Why is there no Biological Evaluation for Steelhead trout, Redband trout, Gray wolf, and Sensitive plants included in the EA?	NEPA	Copies of all associated reports were published to the project website during the comment period. These documents were available for public inspection and were incorporated by reference in accordance with 40 CFR 1502.21. The findings, determinations, and analysis from the Biological Evaluations were summarized in the body of the draft and final EA.
BMBP A55	We ask the Forest Service to take action to remove the Box culvert in Tamarack Creek that is acting as a fish passage barrier as part of this allotment renewal project. We are also very concerned that 2016 is the first year that redds have not been found in Dark Canyon Creek and South Fork Big Wall Creek. What are possible reasons for this? Do possible causes include issues that could be addressed by this allotment renewal process? Would additional fencing in Dark and Lost Canyon Creeks be planned to focus on the areas where redds have been found?	FISHERIES/ NEPA	Additional fencing in Dark and Lost Canyon Creeks proposed in Alternative 3 will reduce impacts to Fish Critical Habitat (Fisheries Report, page 4; final EA, page 83). Monitoring data supports that resources are in satisfactory conditions on the Tamarack Allotment. Utilization standards described in the Land and Resource Management Plan have been consistently met on the allotment. (Range Report; page 3 and Appendices B, C, and D). The box culvert in Tamarack Creek is a barrier, but is not located within the Tamarack Allotment and is outside the scope of this project.
BMBP A56	How much of the spawning and rearing, rearing & migratory, and designated critical habitat for steelhead trout would be exclusion fenced to cattle under Alternative 3?	RANGE	The proposed action identified as alternative 3 proposes to build approximately 2 miles of additional riparian fences on Dark Canyon Creek and Lost Canyon Creek above the existing fences that currently exclude cattle access to those name streams. Additional fencing of Dark Canyon Creek and Lost Canyon Creek would follow adaptive

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	We request that all of it be exclusion-fenced from cattle. (see table 3-15, EA p. 71)		management principles if the Forest Service determines that there is a need for additional fencing based on monitoring and new information related to MCR steelhead and designated critical habitat.
BMBP A57	We are greatly concerned by the Steelhead DPS not meeting viability criteria currently-especially in light of proposed continued livestock grazing in designated critical habitat.	FISHERIES/ RANGE	While the MCR Steelhead DPS is not currently meeting the viability criteria there have been improvements in the viability ratings for some of the component populations. (Fisheries Report, page 7). The overall direct and indirect effects from proposed action Alternatives may impact individuals or habitat but is not likely to result in a trend toward federal listing, and continued viability is expected on the Umatilla NF. A negligible and discountable effect may occur in the project area but, are expected to be immeasurable and insignificant at the Forest scale. The project would be consistent with the Forest Plan as amended by PACFISH.
BMBP A58	How much total mileage is there of Designated Critical Habitat and spawning habitat for Steelhead trout in each Creek listed in Table 3-16, and how does this compare with the total in the Tamarack allotment vs. the amount of miles of this habitat already fenced or proposed for fencing under Alt. 3?	FISHERIES/ RANGE	The total miles of DCH for steelhead are presented in Figure 3-6 and Table 3-15. There is no DCH in Tamarack Creek. There are approximately 44 miles of boundary, division, and enclosure fencing on the allotment and Alternative 3 would include an additional four (4) miles of fencing.
BMBP A59	Stop all cattle use of Steelhead trout spawning and rearing habitat and Designated Critical Habitat. If livestock grazing is to continue on this allotment, we support more fencing or dropped sections of pastures to completely exclude cattle from steelhead spawning, rearing, and Designated Critical habitat. This will also benefit Redband trout.	FISHERIES/ RANGE	Cattle are not turned in to pastures where there is active spawning until after July 15th.
BMBP A60	Was Tamarack Creek historically steelhead spawning habitat?	FISHERIES/ RANGE	Unknown.
BMBP A61	Please establish a Designated Monitoring area on South Fork Big Wall Creek.	FISHERIES/ RANGE	Thank you for your comment. There is currently a Designated Monitoring Area at this location.
BMBP A62	Re: Table 63-17, Columbia club tail: This is indirect contradiction to the statement on p. 72 of the EA that there are no suspected sensitive	FISHERIES	On page 27 in specialist report under Alternatives 2 and 3; The overall direct and indirect effects from proposed action Alternatives may impact individuals or habitat but is not likely to result in a trend toward federal listing, and continued viability is expected on the Umatilla NF. A negligible and discountable effect

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	aquatic species in the Tamarack Allotment.		may occur in the project area but, are expected to be immeasurable and insignificant at the Forest scale. The project would be consistent with the Forest Plan as amended by PACFISH.
BMBP A63	Keep cattle completely out of the Clearwater cryptantha populations by fencing off or closing that part of the allotment.	BOTANY/ RANGE	This species has already completed its yearly lifecycle by the time cattle are in the area (it is an annual). In addition, cattle tend to not linger in dry upland rocky areas. It is the botanist's opinion that fencing is not needed in this particular situation.
BMBP A64	Please send us photographs and descriptions for each of the five sensitive plants discussed on pages 78-79 of the EA, so that we can look for them during field surreys.	BOTANY	Photographs of the five discussed sensitive species have been added to the botany specialist report. Additional identification material is readily available on the internet.
BMBP A65	Reasons for our concerns regarding cattle impacts to Clearwater cryptantha populations, as described in the EA text. (see EA p. 82)	BOTANY	See page 91 of EA. Clearwater cryptantha grows on Dry Rocky Slopes (Wildhorse Pasture-SF Wall Creek Area). Wildhorse Pasture used mid to late season, cattle use in these areas is very limited because conditions are warm and dry and forage quality is low, cattle don't spend much time in these areas. This species has already completed its yearly lifecycle by the time cattle are in the area (it is an annual). They will not likely eat any dead plants that may be present
BMBP A66	We favor the No Grazing alternative for preservation of Sensitive plants, which is a position amply supported by EA analysis on p. 83. Short of no grazing at all in the allotment, we want no grazing in the known sensitive plant species population area. However, there may be plant species missing from the allotment area due to past livestock grazing.	BOTANY	See response to comment A65.
BMBP A67	This is flawed logic since federal up listing could be warranted without equivalent global scale species rarity. (see EA pp 83-84)	BOTANY	Thank you for your comment. The commenter is correct that listing does not necessarily relate to global rarity, but it does relate to each species rarity within its range in the United States.